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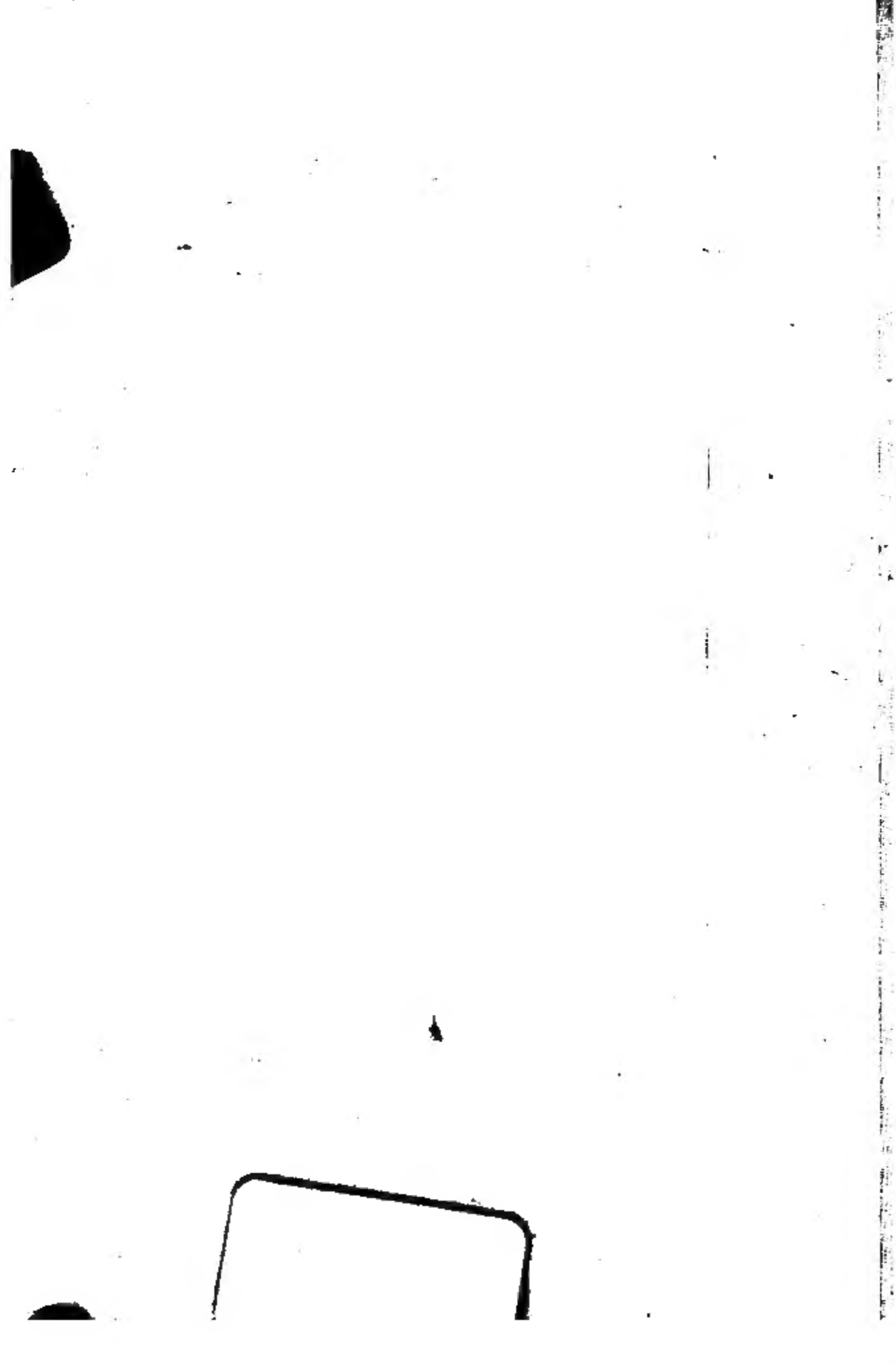
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UNIVERSITY OF MICHIGAN

ANNOUNCEMENT

OF

THE GRADUATE SCHOOL

1892-93

DEPARTMENT OF LITERATURE, SCIENCE, AND THE ARTS

ANN ARBOR, MICHIGAN
PUBLISHED BY THE UNIVERSITY
1892

UNIVERSITY OF MICHIGAN

*For an H. B. ...
... ..*

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CALENDAR.

1892.

- Sept. 26-30. *Examination for Admission to the Department of Literature, Science, and the Arts.*
- Oct. 1. FIRST SEMESTER BEGINS IN ALL DEPARTMENTS OF THE UNIVERSITY.
- Nov. —. Thanksgiving Recess of three days, beginning Tuesday evening, in all Departments.
- Dec. 23. (Evening.) Holiday Vacation begins in all Departments.

1893.

- Jan. 10. Exercises resumed.
- Feb. 17. (Evening.) FIRST SEMESTER CLOSES.
- Feb. 20. SECOND SEMESTER BEGINS.
- April 14. (Evening.) Recess begins, ending April 24 (evening).
- June 29. COMMENCEMENT IN ALL DEPARTMENTS.

FACULTY
OF THE
DEPARTMENT OF LITERATURE, SCIENCE, AND THE ARTS.

Professors and Assistant Professors.

JAMES B. ANGELL, LL.D., *President.**

ALBERT B. PRESCOTT, PH.D., M.D., *Director of the Chemical Laboratory, and Professor of Organic Chemistry.*

REV. MARTIN L. D'OUGE, LL.D., *Dean and Professor of Greek.*

• **CHARLES E. GREENE, A.M., C.E.,** *Professor of Civil Engineering.*

• **WILLIAM H. PETTEE, A.M.,** *Professor of Mineralogy, Economic Geology, and Mining Engineering.*

JOSEPH B. STEERE, PH.D., *Professor of Zoölogy.*

EDWARD L. WALTER, PH.D., *Professor of Romance Languages and Literatures.*

• **ISAAC N. DEMMON, A.M.,** *Professor of English and Rhetoric.*

• **ALBERT H. PATTENGILL, A.M.,** *Professor of Greek.*

• **MORTIMER E. COOLEY, M.E.,** *Professor of Mechanical Engineering.*

• **WOOSTER W. BEMAN, A.M.,** *Professor of Mathematics.*

VICTOR C. VAUGHAN, PH.D., M.D., *Professor of Hygiene and Physiological Chemistry, and Director of the Hygienic Laboratory.*

• **CHARLES S. DENISON, M.S., C.E.,** *Professor of Descriptive Geometry, Stereotomy, and Drawing.*

• **HENRY S. CARHART, A.M.,** *Professor of Physics, and Director of the Physical Laboratory.*

• **RAYMOND C. DAVIS, A.M.,** *Librarian.*

• **VOLNEY M. SPALDING, A.B.,** *Professor of Botany.*

HENRY C. ADAMS, PH.D., *Professor of Political Economy and Finance.*

• **CALVIN THOMAS, A.M.,** *Professor of Germanic Languages and Literatures.*

BURKE A. HINSDALE, PH.D., *Professor of the Science and the Art of Teaching.*

*The President lectures upon International Law and the History of Treaties.

- *RICHARD HUDSON, A.M., *Professor of History.*
- ALBERT A. STANLEY, A.M., *Professor of Music.*
- JOHN DEWEY, PH.D., *Professor of Philosophy.*
- *FRANCIS W. KELSEY, PH.D., *Professor of the Latin Language and Literature.*
- OTIS C. JOHNSON, PH.C., A.M., *Professor of Applied Chemistry.*
- PAUL C. FREER, PH.D., M.D., *Professor of General Chemistry.*
- ANDREW C. McLAUGHLIN, A.B., LL.B., *Professor of American History.*
- JOSEPH B. DAVIS, C.E., *Professor of Geodesy and Surveying.*
- ASAPH HALL, JR., PH.D., *Professor of Astronomy and Director of the Observatory.*
- ISRAEL C. RUSSELL, M.S., *Professor of Geology and Palaeontology.*
- WARREN P. LOMBARD, A.B., M.D., *Professor of Physiology.*
- JOHN C. ROLFE, PH.D., *Acting Professor of Latin.*
- PAUL R. DE PONT, A.B., B.S., *Registrar and Assistant Professor of French.*
- CLARENCE G. TAYLOR, B.S., *Superintendent of Shops in Engineering Laboratory.*
- JACOB E. REIGHARD, PH.B., *Assistant Professor of Zoölogy.*
- THOMAS C. TRUEBLOOD, A.M., *Assistant Professor of Elocution.*
- GEORGE HEMPL, PH.D., *Assistant Professor of English.*
- EDWARD D. CAMPBELL, B.S., *Assistant Professor of Metallurgy.*
- JOSEPH H. DRAKE, A.B., *Assistant Professor of Latin.*
- FRED N. SCOTT, PH.D., *Assistant Professor of Rhetoric.*
- FRANK N. COLE, PH.D., *Assistant Professor of Mathematics.*
- FREDERICK G. NOVY, M.D., Sc.D., *Assistant Professor of Hygiene and Physiological Chemistry.*
- ALEXANDER ZIWET, C.E., *Assistant Professor of Mathematics.*
- GEORGE W. PATTERSON, A.B., S.B., *Assistant Professor of Physics.*
- GEORGE A. HENCH, PH.D., *Assistant Professor of German.*
- CARL W. BELSER, PH.D., *Assistant Professor of Oriental Languages.*
- FRANK C. WAGNER, A.M., B.S., *Assistant Professor of Mechanical Engineering.*
- FRED M. TAYLOR, PH.D., *Assistant Professor of Political Economy.*

GOTTHELF C. HUBER, M.D., *Assistant Professor of Histology.*
 DAVID E. SPENCER, A.M., *Acting Assistant Professor of History.*

ALVISO B. STEVENS, PH.C., *Assistant Professor of Pharmaceutical Chemistry.*

Instructors and Assistants.

JOSEPH L. MARKLEY, PH.D., *Instructor in Mathematics.*

WILLARD K. CLEMENT, PH.D., *Instructor in Latin.*

MORITZ LEVI, A.B., *Instructor in French.*

FRED MORLEY, B.S., *Instructor in Descriptive Geometry and Drawing.*

ELMER A. LYMAN, A.B., *Instructor in Mathematics.*

HIRAM A. SOBER, A.B., *Instructor in Latin.*

GEORGE O. HIGLEY, B.S., *Instructor in General Chemistry.*

ARTHUR G. HALL, B.S., *Instructor in Mathematics.*

GEORGE H. MEAD, A.B., *Instructor in Philosophy.*

ALFRED H. LLOYD, A.M., *Instructor in Philosophy.*

RAYMOND L. WEEKS, A.M., *Instructor in French.*

JONATHAN A. C. HILDNER, A.B., *Instructor in German.*

HERMAN V. AMES, PH.D., *Instructor in History.*

GEORGE REBEC, PH.B., *Instructor in English.*

ERNST VOSS, *Instructor in German.*

DAVID M. LICHTY, M.S., *Instructor in General Chemistry.*

JOHN O. REED, PH.B., *Instructor in Physics.*

GEORGE H. ROWE, B.S., *Instructor in Physics.*

BENJAMIN P. BOURLAND, A.B., *Instructor in French.*

JOHN R. EFFINGER, PH.B., *Instructor in French.*

LORENZO N. JOHNSON, A.M., *Instructor in Botany.*

HENRY B. WARD, PH.D., *Instructor in Animal Morphology.*

HERBERT F. DE COU, A.M., *Instructor in Greek and Sanskrit.*

ELMER L. ALLOR, B.S., *Instructor in Astronomy.*

BERT J. VOS, PH.D., *Instructor in German.*

ERNST H. MENDEL, A.B., *Instructor in German.*

ALICE HUNT, *Assistant in Drawing.*

MOSES GOMBERG, B.S., *Assistant in Organic Chemistry.*

BERNHARD C. HESSE, PH.C., *Assistant in Qualitative Analysis.*

EUGENE H. ROBERTSON, PH.B., *Assistant in Physiological Chemistry.*

CHARLES H. COOLEY, A.B., *Assistant in Political Economy.*

FRANK H. DIXON, PH.B., *Assistant in Political Economy.*

WILLIAM A. KICKLAND, B.S., *Assistant in Vertebrate Morphology.*

ANNOUNCEMENT OF THE GRADUATE SCHOOL.

GENERAL INFORMATION.

The University of Michigan.

The University of Michigan is a part of the public educational system of the State, and derives from the State, in one way or another, the greater part of its revenue. The University comprises the Department of Literature, Science, and the Arts, and five professional schools, each of which has its own faculty and issues each year a separate departmental Announcement. The various faculties aggregated, in 1891-92, one hundred and eleven officers of instruction, besides numerous assistants, some of whom participate in the work of teaching. Nearly twenty-seven hundred students, representing forty-six States and Territories, and fifteen foreign countries, were in attendance.

The Department of Literature, Science, and the Arts.

The Department of Literature, Science, and the Arts combines under one organization the different lines of work that are often represented elsewhere by the names college, scientific school, and school of technology. Its Faculty numbered, in 1891-92, seventy-four teachers. The students in attendance numbered over thirteen hundred, of whom fifty were graduates. The presence of such a number of graduate students, taken with the fact that high specialization of work is not uncommon among undergraduates, tends to create a genuine university atmosphere, and to assure the advanced student of intellectual comradeship.

The Libraries.

The various libraries of the University contain about 80,000 volumes, and include a number of important special collections. Among these are the McMillan Shakespeare Library, 3,393 volumes; the Parsons Library (political science), 4,325 volumes; the Hagerman Collection (history and political science), 2,600 vol-

umes, and a Goethe Library of 800 volumes. The general reading room seats two hundred and sixteen readers, and separate rooms are provided for advanced students to work in with the necessary books close at hand. Under certain restrictions graduate students have access to the book rooms. The library takes about two hundred periodicals, and is open, in term time, eleven and one-half hours daily, except on Sundays and legal holidays.

The Laboratories.

The University has an observatory and twelve laboratories more or less fully equipped for routine instruction and for original research. These are (omitting those connected exclusively with the work of the Medical School): the Botanical, Chemical, Engineering, Geological, Histological, Hygienic, Physical, Physiological, Psychological, and Zoölogical. For a fuller account of these laboratories and their various resources, as also of the various University collections for the study of art, archæology, ethnology, mineralogy, palæontology, systematic zoölogy, etc., consult the annual Calendar, which may be had gratis on application to Mr. James H. Wade, Secretary of the University.

The Scientific Societies.

There are connected with the University a number of voluntary scientific organizations which add not a little to the graduate student's opportunity for scientific training. The membership of these societies consists usually of University teachers and advanced students who are pursuing a common specialty. They are variously organized and meet weekly, fortnightly, or monthly, as the case may be, for the reading and discussion of formal papers, for reports upon observation and experiment, reviews of recent technical literature, etc. Some of them do work of a highly creditable and stimulating character. The existing associations of this character are the Biological Society, Chemical Society, Engineering Society, Geological Society, Mathematical Club, Mathematical Society, Philological Society, Philosophical Society, and Political Science Association.

ORGANIZATION OF GRADUATE WORK.

The Graduate School.

At the close of the academic year 1891-92, the Faculty of the Department of Literature, Science, and the Arts decided, after long discussion of the subject, to establish a Graduate School.

This action grew out of a conviction that the time had come when the numerous advanced courses offered by the Department,—courses that have developed during the past few years from the continual extension of the elective system,—should be recognized and announced as something distinct from the work of an ordinary college course. It was felt that provision should be made for a more systematic and efficient administration of this higher work, and, so far as possible, for the separate instruction of graduate students. It was also desired to lay foundations for the future development of university (as distinguished from collegiate) work. Acting from these motives, the Faculty determined to establish a Graduate School in connection with the Department of Literature, Science, and the Arts, and to entrust its management provisionally to an Administrative Council of which the President should be Chairman. This Council will consist, for the year 1892-93, of the heads of departments.

It is possible that the newly constituted Council may modify to some extent the regulations that have hitherto been in force respecting graduate work; but provisionally these regulations still hold good. The more important of them are explained in the following pages.

The University System.

Every graduate student who is a candidate for a higher degree, works upon the so-called 'university system,' the essential features of which are specialization of study, a final examination and a thesis. The student selects a 'major study' and, in general, two 'minor studies,' his selection being subject, however, to the approval of the Faculty. When the choice has been made and approved, the student's work is henceforth under the immediate supervision of a committee consisting of those professors who have charge of the studies chosen, the one having charge of the major study being chairman. This committee arrange a course of study suited to the desires, needs and previous attainments of the student, assist him in the choice of a subject for a thesis, pass judgment upon his thesis when it is written, conduct his examination and, if he passes, report him to the Faculty as worthy of the degree sought. The nature of the work prescribed, and of the committee's oversight, varies more or less according to the subjects chosen, the degree sought, and the previous attainments of the student. The work may consist of attendance upon certain specified courses, of reading to be done privately and reported upon, or of an original research to be carried on more or less independently.

Graduate students who do not wish to work for a higher degree are admitted to any course upon satisfying the professor in charge that they are qualified to pursue the work to advantage. It may be added also that for the Master's degree the Faculty may, at their discretion, approve a course of study which does not confine the candidate rigorously to a major and two minor studies.

THE HIGHER DEGREES.

Degrees Conferred.

The higher degrees conferred in the Department of Literature, Science, and the Arts are those of Master of Arts, Master of Science, Master of Philosophy, Master of Letters, Doctor of Philosophy, Doctor of Science, Doctor of Letters, Civil Engineer, Mechanical Engineer, Mining Engineer, and Electrical Engineer.

The Masters' Degrees.

A Bachelor of this University, or of any other reputable university or college, may become a candidate for the corresponding Master's degree, and may be recommended for the degree after one year's residence at the University, provided he present a satisfactory thesis and pass an examination on the course of study prescribed by his committee. A Bachelor of this University may become a candidate for the corresponding Master's degree with the privilege of pursuing his studies *in absentia*, and may then be recommended for the degree after two years of study, provided he present a satisfactory thesis and pass examination. Every candidate studying *in absentia* is required to present a report of progress, at least once in each semester, to the chairman of the committee in charge of his work; failure on the part of any candidate to make such report is regarded as indicating a purpose to withdraw from his candidacy.

N. B. Students properly qualified may be permitted to pursue at the same time studies for a Master's degree, and studies in any of the professional schools, on condition that the term of study and residence in this Department be extended to cover two years instead of one.

The Doctors' Degrees.

The Doctors' degrees are conferred only on persons who have previously received a Bachelor's degree, either here or at some other reputable university or college, and also during residence here have shown special proficiency in some one branch of study,

and good attainments in at least two others, and have presented a thesis evincing the power of independent research. It is not intended that the Doctor's degree shall be won merely by faithful and industrious work for a prescribed time in some assigned course of study, and no definite term of required residence can be specified; but it is the practice to require at least one full year's residence of candidates that have already earned a Master's degree, and at least two full years of candidates that have taken only a Bachelor's degree. The degree of Doctor of Philosophy is open to persons that have received the degree of Bachelor of Arts, or Bachelor of Philosophy; the degree of Doctor of Science to persons who have received the degree of Bachelor of Science, and the degree of Doctor of Letters to persons who have received the degree of Bachelor of Letters.

The Higher Degrees in Engineering.

The degree of Civil Engineer may be conferred upon Bachelors of Science of this University who have taken the degree for a course in Civil Engineering, if they furnish satisfactory evidence that they have pursued further technical studies for at least one year, and, in addition, have been engaged in professional work, in positions of responsibility, for another year. The first of the above requirements may be satisfied by pursuing at the University, under the direction of the Faculty, a prescribed course of study for an amount of time, not necessarily consecutive, equivalent to an academic year. If the candidate does not reside at the University, his course of study must be approved in advance by the Professor of Civil Engineering, and he must prepare a satisfactory thesis on some engineering topic, to be presented, together with a detailed account of his professional work, one month, at least, before the annual Commencement at which he expects to secure the degree.

The conditions on which the degrees of Mechanical Engineer, Mining Engineer, and Electrical Engineer are conferred, as second degrees, upon Bachelors of Science of this University who have taken the degree for a course in Mechanical Engineering, Mining Engineering, or Electrical Engineering, are analogous in character to those prescribed for the degree of Civil Engineer.

Special Regulations Relating to the Higher Degrees.

1. Applicants for an advanced degree, whether resident or non-resident, are required to announce to the Faculty, through the



President, as early as the fifteenth of October, the particular branches of study to which they wish to give special attention. The supervision of their work will then be entrusted to the proper committee.

2. The subject of the thesis must be announced to the President as early as the first of December of the college year in which the applicant expects to take the degree.

3. It is expected in the case of every applicant that the thesis be upon a subject requiring research.

4. The thesis must be completed and put into the hands of the chairman of the proper committee as early as the first of May of the year in which the applicant expects to take the degree.

5. The thesis must be prepared for close scrutiny with reference not only to its technical merits, but also to its merits as a specimen of literary workmanship. It must be preceded by an analytical table of contents, and a carefully prepared account of the authorities made use of.

6. The thesis must be read and defended in public at such time as the Faculty may appoint; and, in case of a Master's degree, a bound copy, either written or printed, must be deposited in the University library.

7. Candidates for the degree of Doctor of Philosophy, Doctor of Science, or Doctor of Letters, in case of the acceptance of their theses, are also required to have the accepted theses printed, and to present twenty-five copies of the same to the University library, unless by special vote of the Faculty a smaller number is deemed sufficient.

ADMISSION AND REGISTRATION.

Holders of a Bachelor's degree are, in general, admitted to the University without examination, and when so admitted are allowed to take any course for which they are qualified; but the statements made above with respect to candidacy for higher degrees apply only to persons whose undergraduate course has been substantially equivalent to that prescribed at this University. Where that is not the case, the student may be required to take certain undergraduate courses, or to prolong the term of his residence. Questions of this character will be referred to a committee who will consider each case upon its merits.

Applicants for admission to the Graduate School should report first to the President (to whom, also, inquiries by letter may be addressed), present their credentials and announce their

purpose with regard to graduate study. The Registrar will then direct them to the proper committee for consultation, and will also give directions respecting registration and payment of fees. The committee, subject to the rules of the Administrative Council, will decide upon all questions pertaining to the applicant's course of study and candidacy for a degree, and report the decision as soon as possible.

FEES AND EXPENSES.

Matriculation Fee.—Every student before entering any department of the University is required to pay a matriculation fee. This fee, which, for citizens of Michigan, is ten dollars, and for those who come from any other State or country, twenty-five dollars, is paid but once, and entitles the student to the privileges of permanent membership in the University. There is no fee for tuition.

Annual Fee.—In addition to the matriculation fee, every student has to pay an annual fee for incidental expenses. This fee is paid the first year of residence at the University, and every year of residence thereafter. Resident graduates are required to pay the same annual fee as undergraduates. The annual fee in the Department of Literature, Science, and the Arts is, for Michigan students, twenty dollars; for all others, thirty dollars.

The matriculation fee and the annual fee must be paid at the beginning of the college year. A by-law of the Board of Regents provides that no student or graduate shall be allowed to enjoy the privileges of the University until he has paid all fees that are due.

Laboratory Expenses.—Students who pursue laboratory courses of study are required to pay for the materials and apparatus actually consumed by them. The deposits required in advance are different for the different courses, ranging from one to twenty dollars. The laboratory expenses of students will vary with their prudence and economy. Experience has shown that in the chemical laboratory the average expense for all courses is about one dollar and twenty cents a week.

Diploma Fee.—The fee for the diploma given on graduation is ten dollars, and the by-laws of the Board of Regents prescribe that no person shall be recommended for a degree until he has paid all dues, including the fee for diploma.

Other Expenses.—Students obtain board and lodging in private families for from three to five dollars a week. Clubs are

also formed in which the cost of board is from one dollar and a half to two dollars and a half a week. Room rent varies from one dollar to three dollars a week for each student. The annual expenses of students, including clothing and incidentals, are, on the average, about three hundred and seventy dollars.

There are no dormitories, no commons, and no stipends (with the exception of one fellowship) connected with the University. Students on arriving in Ann Arbor can obtain information in regard to rooms and board by calling at the Steward's office.

COURSES OF INSTRUCTION.

The following list of advanced courses does not attempt in all cases to discriminate graduate from undergraduate instruction; the reason being that the possession of a Bachelor's degree may mean much or little as regards a student's proficiency in a particular subject. With a few exceptions, duly marked as for beginners, the courses here mentioned all presuppose a somewhat extensive preliminary study of the subject, a study covering from one to six years, according to the circumstances. In some instances the attempt is made to indicate roughly, in terms of both time and work, the amount of preparation required for entrance upon the courses described. Most of the courses are advanced electives which are open to undergraduates, but have been shown by experience to be suited to the needs of many graduates. Where nothing is said to the contrary, it may be assumed that any given course is of that character, all courses that are primarily for graduates being so designated. Some departments have adopted a division into undergraduate, intermediate, and graduate courses, in which cases nothing is said here of the 'undergraduate' courses. The term 'intermediate' has, however, a special significance, since in all courses so designated, special instruction of one hour a week, adapted as far as possible to the needs of individuals, will be given to graduate students. The numbers are those found in the general Announcement of the Department, which may be had on application to Mr. James H. Wade, Secretary of the University.

GREEK.

The following advanced courses in Greek presuppose the usual preparatory course of two years, and also a collegiate course of two years devoted to the history of Greek literature and to reading from Lysias, Xenophon, Homer, Demosthenes, the tragic

ANNOUNCEMENT OF THE GRADUATE SCHOOL.

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ORGANIZATION OF GRADUATE WORK.

The Graduate School.

At the close of the academic year 1891-92, the Faculty of the Department of Literature, Science, and the Arts decided, after long discussion of the subject, to establish a Graduate School.

An advanced course, in which attention is paid not only to correctness of expression, but also to matters of style and the finer distinctions of the language.—*Two hours a week, second semester.*

14. Latin Grammar.

Lectures.—*Three hours a week, second semester.*

17. Seminary in Latin Masterpieces.

A critical study of selected works of Roman Literature.—*Three hours a week, first semester.*

18. Ovid, Fasti.

Studies in Roman topography and mythology.—*Two hours a week, second semester.*

21-2. Teachers' Seminary.

Critical study of Cæsar, Cicero and Vergil, with pedagogical discussion and practice.—*Two hours a week, both semesters.*

Assistant Professor DRAKE:—

15. Seneca.

Selections from the Essays and Epistles.—*Two hours a week, first semester.*

The Latin FACULTY.

23-4. Reports on Periodical Literature.

The professors and instructors meet regularly for reports on the contents of the technical journals. Graduate students are admitted to a share in this work.—*One hour a week, throughout the year.*

SANSKRIT.

The elementary courses in Sanskrit, which are not here enumerated, represent a year's work, two hours a week, in Perry's Primer, Whitney's Grammar and the easier texts in Lanman's Reader.

Mr. DE COU:—

3. Lanman's Sanskrit Reader continued.

Interpretation of the extracts from the Kathasarit-sagara, Manava Dharmaçastra and selected Vedic hymns.—*One hour a week, first semester.*

4. Either Kâlidâsa's Çakuntalâ, or Windisch's Zwölf Hymnen des Rigveda mit Sâyana's Commentar.

The choice between the two will depend upon the preferences of those concerned.—*One hour a week, second semester.*

HEBREW.

The omitted elementary courses in Hebrew represent one year's work, two hours a week, in Harper's Hebrew Method and Elements of Hebrew, and in the reading of selections from Genesis and I Samuel.

Assistant Professor BELSER:—

3. The Psalms.

Lectures, with interpretation of selected psalms.—*Two hours a week, first semester.*

5. The Quotations from the Old Testament in the New.

A comparative study of the Septuagint and Hebrew texts.—*One hour a week, first semester.*

6. Isaiah i-xxxix.

A study in Hebrew exegesis and literary criticism.—*Two hours a week, second semester.*

8. The Books of Samuel in Hebrew and Greek.

A study in textual criticism. Handbook: Driver's Notes on the Hebrew Text of the Books of Samuel.—*Two hours a week, second semester.*

ASSYRIAN.

The courses in Assyrian presuppose a year's work in either Hebrew or Arabic.

Assistant Professor BELSER:—

1. Beginners' Course.

Lyon's Manual and Delitzsch's Lesestücke. Principles of Assyrian grammar, with exercises in the transliteration and interpretation of historical texts.—*Two hours a week, first semester.*

2. Advanced Course.

Interpretation of the Assyrian account of the deluge, the descent of Ishtar into sheol, and fragments of the creation tablets and psalms.—*Two hours a week, second semester.*

ARABIC.

Assistant Professor BELSER:—

and good attainments in at least two others, and have presented a thesis evincing the power of independent research. It is not intended that the Doctor's degree shall be won merely by faithful and industrious work for a prescribed time in some assigned course of study, and no definite term of required residence can be specified; but it is the practice to require at least one full year's residence of candidates that have already earned a Master's degree, and at least two full years of candidates that have taken only a Bachelor's degree. The degree of Doctor of Philosophy is open to persons that have received the degree of Bachelor of Arts, or Bachelor of Philosophy; the degree of Doctor of Science to persons who have received the degree of Bachelor of Science, and the degree of Doctor of Letters to persons who have received the degree of Bachelor of Letters.

The Higher Degrees in Engineering.

The degree of Civil Engineer may be conferred upon Bachelors of Science of this University who have taken the degree for a course in Civil Engineering, if they furnish satisfactory evidence that they have pursued further technical studies for at least one year, and, in addition, have been engaged in professional work, in positions of responsibility, for another year. The first of the above requirements may be satisfied by pursuing at the University, under the direction of the Faculty, a prescribed course of study for an amount of time, not necessarily consecutive, equivalent to an academic year. If the candidate does not reside at the University, his course of study must be approved in advance by the Professor of Civil Engineering, and he must prepare a satisfactory thesis on some engineering topic, to be presented, together with a detailed account of his professional work, one month, at least, before the annual Commencement at which he expects to secure the degree.

The conditions on which the degrees of Mechanical Engineer, Mining Engineer, and Electrical Engineer are conferred, as second degrees, upon Bachelors of Science of this University who have taken the degree for a course in Mechanical Engineering, Mining Engineering, or Electrical Engineering, are analogous in character to those prescribed for the degree of Civil Engineer.

Special Regulations Relating to the Higher Degrees.

1. Applicants for an advanced degree, whether resident or non-resident, are required to announce to the Faculty, through the

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President, as early as the fifteenth of October, the particular branches of study to which they wish to give special attention. The supervision of their work will then be entrusted to the proper committee.

2. The subject of the thesis must be announced to the President as early as the first of December of the college year in which the applicant expects to take the degree.

3. It is expected in the case of every applicant that the thesis be upon a subject requiring research.

4. The thesis must be completed and put into the hands of the chairman of the proper committee as early as the first of May of the year in which the applicant expects to take the degree.

5. The thesis must be prepared for close scrutiny with reference not only to its technical merits, but also to its merits as a specimen of literary workmanship. It must be preceded by an analytical table of contents, and a carefully prepared account of the authorities made use of.

6. The thesis must be read and defended in public at such time as the Faculty may appoint; and, in case of a Master's degree, a bound copy, either written or printed, must be deposited in the University library.

7. Candidates for the degree of Doctor of Philosophy, Doctor of Science, or Doctor of Letters, in case of the acceptance of their theses, are also required to have the accepted theses printed, and to present twenty-five copies of the same to the University library, unless by special vote of the Faculty a smaller number is deemed sufficient.

ADMISSION AND REGISTRATION.

Holders of a Bachelor's degree are, in general, admitted to the University without examination, and when so admitted are allowed to take any course for which they are qualified; but the statements made above with respect to candidacy for higher degrees apply only to persons whose undergraduate course has been substantially equivalent to that prescribed at this University. Where that is not the case, the student may be required to take certain undergraduate courses, or to prolong the term of his residence. Questions of this character will be referred to a committee who will consider each case upon its merits.

Applicants for admission to the Graduate School should report first to the President (to whom, also, inquiries by letter may be addressed), present their credentials and announce their

tions from Wilmann's *Deutsche Grammatik*; (3) advanced German composition; (4) discussion of assigned masterpiece in a German essay, and (5) pedagogical discussion upon methods, aims and ideals in the teaching of German, text-books, the teacher's reference library, etc.—*Three hours a week, throughout the year.*

11, 12. The History of German Literature.

Lectures (in English) once a week, and recitations twice a week from Müller's *German Classics*. The work covers the ground from the earliest times to the death of Goethe.—*Intermediate course, three (four) hours a week, throughout the year.*

12. Goethe Seminary.

Critical investigations pertaining to Goethe's 'storm and stress' period (the works of 1773-5). Open only to those who are prepared for research work in German literature.—*Graduate course, two hours a week, first semester.*

14. Schiller Seminary.

Schiller's philosophical poems as related to his studies of Kant and Fichte. Open only to those who are prepared for research work in German literature.—*Graduate course, two hours a week, second semester.*

16. Laokoön.

A study of Lessing's essay, with comparison of the critiques by Herder and Goethe.—*Two hours a week, second semester.*

Assistant Professor HENCH:—

7, 8. Middle High German.

In the first semester Wright's *Primer* and Paul's *Grammar*, in the second a study of representative works (*Volksepos, Kunstepos, Walther*), with lectures upon the linguistic and literary aspects of the works read.—*Intermediate course, two (three) hours a week, throughout the year.*

16. Old High German.

Beginners' course. Braune's *Althochdeutsche Grammatik* and *Althochdeutsches Lesebuch*.—*Graduate course, two hours a week, second semester.*

20. Historical German Grammar.

Important facts and phenomena of modern German grammar will be taken up more or less systematically

and explained from a historical and comparative point of view.—*Intermediate course, two (three) hours a week, second semester.*

GOTHIC.

Assistant Professor HENCH:—

1. Wright's Gothic Primer.

The course is for beginners, but graduate students who have had an elementary course in Gothic will be given special advanced instruction one hour a week.—*Graduate course, two (three) hours a week, first semester.*

SWEDISH AND DANISH-NORWEGIAN.

Only elementary courses are given, those in Danish-Norwegian being omitted in 1892-3.

ENGLISH AND RHETORIC.

The advanced work of this department proceeds along three main lines:

1. *History and Philology of the English Language.* Opportunity is offered for (1) a detailed study of the phonology, morphology and syntax of Old English; (2) a survey of the historical development of the language, and (3) a special study of the spoken English of to-day.

2. *Higher Rhetoric.* The main object here is to furnish a sound working basis for the critical study of literature. A course in the science of rhetoric is followed by an inductive study of the principles of style from masterpieces of prose, and a course in the classics of criticism and literary theory.

3. *Literature.* In the seminary courses in English and American literature opportunity is offered, through reading and discussion, for original research bearing upon (1) the nature and meaning of the great movements in the history of literature; (2) the influence exercised upon English and American writers by the literature of other nations, and (3) the interpretation of works of literary art in the light of established critical principles.

The following courses (open also to undergraduates who are prepared to take them) will ordinarily be found adapted to the needs of graduate students. In case of persons who have taken these courses for their first degree, special advanced courses, for graduate study, are provided after conference with the candidate.

Professor DEMMON:—

11. English Literature Seminary.

Each student is expected, first, to present two papers,

one an essay upon an assigned masterpiece, the other a critique of a fellow-student's essay; second, to participate each week in a general extempore discussion of the work under consideration, and third, to read the entire list of works with which the course deals. The list of masterpieces is as follows: More's Utopia; Bacon's Essays; Milton's Areopagitica; Burke's Reflections on the French Revolution; Carlyle's Sartor Resartus; George Eliot's Silas Marner, Spenser's Faery Queen, Book I; Shakespeare's Sonnets; Milton's Paradise Lost; Dryden's Absalom and Achitophel; Pope's Essay on Man; Wordsworth's Excursion; Tennyson's Princess.—*Two hours a week, first semester.*

12. Shakespeare Seminary.

The method is similar to that in Course 11. The plays selected are: A Midsummer Night's Dream; The Merchant of Venice; As You Like It; Twelfth Night; The Tempest; Richard II; the two parts of Henry IV; Henry V; Richard III; Hamlet; Macbeth; Othello; King Lear, and Coriolanus.—*Two hours a week, second semester.*

13. History of the English Drama.

Lectures. Recommended in connection with Course 12.—*One hour a week, second semester.*

14. American Literature Seminary.

Authors studied: Irving, Poe, Hawthorne, Bryant, Longfellow, Emerson, Thoreau, Bayard Taylor, Whittier, Holmes, Lowell, Howells and James. The method is similar to that in Course 11. Representative works of the authors named are studied and an attempt is made to discover the distinctively American element in them.—*Two hours a week, second semester.*

Assistant Professor HEMPL:—

7. Historical English Grammar.

Teachers' course.—*Two hours a week, first semester.*

8. Old English (Anglo-Saxon) Poetry.

Advanced course.—*Two hours a week, second semester.*

9. Old English Syntax.

Two hours a week, first semester.

16. The Elements of Phonetics.

Two hours a week, second semester.

20. Old English Phonology and Morphology.

Two hours a week, second semester.

Assistant Professor SCOTT:—

2. The Science of Rhetoric.

Two hours a week, first semester.

10. Problems in Higher Rhetoric and Literary Criticism.

Reading and discussion of the whole or parts of standard works in rhetoric and literary criticism.—*Two hours a week, second semester.*

15. Principles of Style.

Inductive study of masterpieces of English prose with a view to verifying rhetorical principles.—*Two hours a week, first semester.*

HISTORY.

The following courses presuppose two or three semesters of collegiate study in the special field of history (American or European) with which the course is concerned. Numbers 5, 5a, 11, 12 and 12a are suitable for graduate students who have specialized in history. Attention is also called to the provision by which graduate students in European history receive special instruction of one hour a week.

Professor HUDSON:—

*13. Seminary for the comparative study of institutions and of administrative machinery and methods.

Two hours a week, second semester.

Professor McLAUGHLIN:—

5. Constitutional Law and Political Institutions of the United States.

The course is based on Cooley's Principles of Constitutional Law and Bryce's American Commonwealth, but includes collateral reading and the study of leading cases from the reports. The aim is to give a knowledge of the Constitution as it has been interpreted by the courts and is daily interpreted in action.—*Three hours a week, first semester.*

* Omitted in 1892-93, Professor Hudson being absent on leave.

5a. Graduate Seminary, supplementary to Course 5.

Graduate students who take Course 5 will have their reading directed and will engage in special investigations relating more particularly to municipal government.—*One hour a week, first semester.*

11. Seminary. The Constitutional History of the United States during the Rebellion and the period of Reconstruction.

A special study is made of the great constitutional questions which arose between 1860 and 1876, the student being expected to do original work in the primary authorities under the personal direction of the professor.—*Two hours a week, first semester.*

12. Political Science and Comparative Constitutional Law.

Study of the best text-books, with lectures and collateral reading. A somewhat detailed examination of the main features of the constitutions of the leading European states is made, with a cursory study of the historical growth of political principles and forms of government.—*Two hours a week, second semester.*

12a. Graduate Seminary, supplementary to Course 12.
One hour a week, second semester.

Assistant Professor SPENCER:—

9. History of the French Revolution and of the Empire of Napoleon.

Text-books, Gardiner and Fyffe. See under Course 20.—*Three hours a week, first semester.*

10. History of Europe since 1815.

Lectures, with text-book and collateral reading. See under course 20.—*Two hours a week, second semester.*

17. The Ancient Régime in France.

Text-book, Taine. A study of the condition of government, society and institutions in France on the eve of the Revolution. See under Course 20.—*Two hours a week, second semester.*

20. Conferences.

Graduate students in European history will meet regularly for conference upon their work and will receive instruction respecting original sources of information,

the use of authorities, etc.—*One hour a week, throughout the year.*

The Historical FACULTY:—

19. Reports and Discussions.

Graduate students will meet the teachers of history regularly for the discussion of current historical literature and of topics in constitutional and administrative law.—*Once in two weeks, throughout the year.*

PHILOSOPHY.

The following advanced courses presuppose instruction in logic, ethics and general psychology; also a general introduction to philosophy and a somewhat extended study of the history of philosophy, ancient, medieval and modern. Candidates for a higher degree who have not had a preparation equivalent to this will be expected to take certain of the lower courses, either before entering upon, or in connection with, their graduate work. Courses 20, 21, 22, 23 and 24 are primarily for graduates. In those classed as 'intermediate' special instruction of one hour a week will be given to graduates. It may be added that advanced courses bearing upon the history of philosophy are given in the departments of Greek, Latin, French and German.

Professor DEWEY:—

13. Political Philosophy.

Lectures on the theory and institutions of social organization.—*Intermediate course, three hours a week, first semester.*

13a. Special studies in the History of Political Philosophy.

Plato's Republic, Kant's Elements of Law, and Spencer's Sociology.—*Intermediate course, one hour a week, first semester.*

18. Hegel's Logic.

Intermediate course, two hours a week, second semester.

18a. The Hegelian Categories in their Relation to the Kantian.

Intermediate course, one hour a week, second semester.

21. Seminary.

The development of Christian philosophy in the first four centuries after Christ.—*Graduate course, three hours a week, first semester.*

24. Seminary.

The special topic will be announced later.—*Graduate course, second semester.*

Assistant Professor SCOTT:—

12. Æsthetics.

The theory of the beautiful in nature and art. Lectures and experimental work.—*Two hours a week, first semester.*

22. Æsthetics of Renaissance Art.

Lectures and individual study.—*Graduate course, one hour a week, second semester.*

Mr. MEAD:—

4a. Special Studies in Ancient Philosophy.

Intermediate course, one hour a week, first semester.

5a. Special Studies in the History of Modern Philosophy.

Intermediate course, one hour a week, second semester.

9. Experimental Psychology.

Statement of psychological problems in terms of the organism.—*Three hours a week, first semester.*

14. Matter and Motion.

The net results of the concepts of modern science; the writings of Spencer and Clifford being taken as a starting point.—*Two hours a week, second semester.*

17. English Psychology.

From Locke, through Hartley and the Mills, to Bain.—*Three hours a week, second semester.*

20. Seminary.

Investigations of the psychical phenomena of living organisms. Laboratory work and lectures.—*Graduate course, four hours a week, first semester.*

21. Seminary.

Continuation of Course 20, with study of pathological psychology in asylums and hospitals.—*Graduate course, four hours a week, second semester.*

Mr. LLOYD:—

15. Kant's Critique of Pure Reason.

Meiklejohn's translation. Lectures and readings.—*Intermediate course, two hours a week, first semester.*

15a. Special Studies in Kant's Critique.*Intermediate course, one hour a week, first semester.***16. The Philosophy of Spinoza.***Elwee's translation. Lectures and readings.—Intermediate course, two hours a week, second semester.***16a. Special Studies in the Philosophy of Spinoza.***Intermediate course, one hour a week, second semester.***THE SCIENCE AND THE ART OF TEACHING.**

The more elementary instruction, not here described, comprises a practical course upon the arts of teaching and governing, methods of instruction and general school-room practice, school hygiene and school law; a course upon school supervision, dealing with general school management, the art of arranging and grading courses of study, the conduct of institutes, etc.; and, finally, a theoretical and critical course upon the principles underlying the arts of teaching and governing.

Professor HINSDALE:—**3. History of Education: ancient and medieval.***Recitations and lectures. Text-book: Compayré's History of Pedagogy.—Three hours a week, first semester.***4. History of Education: modern.***Recitations and lectures. Text-book: Compayré's History of Pedagogy.—Three hours a week, second semester.***6. The Comparative Study of Educational Systems.***Lectures.—Two hours a week, second semester.***7. Seminary.***Study and discussion of special topics in the history and philosophy of education.—Two hours a week, second semester.***POLITICAL ECONOMY.**

The undergraduate courses, which are not here enumerated but are, in general, presupposed as preparation, represent at least one year's work, covering the elements of political economy, the history of industrial society, and an introductory study of the more important special problems of economics, such as free trade and protection, industrial crises, labor legislation, etc. In the 'intermediate' courses special instruction of one hour a week will be given to graduate students, the

extra hour being devoted to a more careful analysis and a more extended discussion than is possible in the lectures.

Professor ADAMS:—

6. The Transportation Problem.
Intermediate course, two hours a week, second semester.
15. Critical Analysis of Economic Thought.
Graduate course, one hour a week, first semester.
16. Critical Examination of the Labor Problem and the Monopoly Problem.
Graduate course, one hour a week, second semester.
17. Seminary in Finance.
Graduate course, two hours a week, first semester.
18. Seminary in Economics.
Graduate course, two hours a week, second semester.

Professor ADAMS and Mr. DIXON:—

4. Principles of the Science of Finance.
Lectures twice a week by Professor ADAMS, with quiz upon the lectures by Mr. DIXON.—*Intermediate course, two hours a week, second semester.*

Assistant Professor TAYLOR:—

7. History and Theory of Land Tenure and Agrarian Movements.
Intermediate course, two hours a week, first semester.
8. History and Theory of Socialism and Communism.
Intermediate course, two hours a week, second semester.
9. History and Principles of Currency and Banking.
Intermediate course, two hours a week, first semester.
11. Industrial and Commercial Development of the United States.
Intermediate course, two hours a week, first semester.

Mr. COOLEY:—

13. Theory of Statistics.
Intermediate course, one hour a week, first semester.
12. History of Political Economy.
Ingram's text-book.—*Intermediate course, two hours a week, second semester.*

Mr. DIXON:

10. History of the Tariff in the United States.

Taussig's text-book.—*Intermediate course, two hours a week, second semester.*

The Economic FACULTY:—

21-2. Current Economic Legislation and Literature.

Reports and discussions.—*Graduate course, two hours once in two weeks, throughout the year.*

INTERNATIONAL LAW.

The courses in international law presuppose a general acquaintance with modern European history.

President ANGELL:—

1. Lectures on International Law.

Two hours a week, first semester.

2. History of Treaties.

Two hours a week, second semester.

MUSIC.

The lower courses, not here enumerated, provide instruction in the science and practice of choral music, the science of harmony, simple and double counterpoint and canon and fugue. Of the following advanced courses 10a and 10b are primarily for graduates.

Professor STANLEY:—

9a. History of Music: to modern opera.

Lectures.—*Two hours a week, first semester.*

9b. History of Music: modern music; masterpieces.

Lectures.—*Two hours a week, second semester.*

10a, 10b. Free Composition; instrumentation.

Hours to be arranged; throughout the year.

11a. Musical Analysis.

Lectures and text-book.—*One hour a week, first semester.*

11b. Musical Criticism.

Lectures.—*One hour a week, second semester.*

MATHEMATICS.

The courses mentioned below presuppose the usual preparatory course in algebra and elementary geometry, plane, solid,

and spherical, together with two years of collegiate study devoted to trigonometry, higher algebra, plane analytic geometry, and differential and integral calculus. Courses 5, 7, 8, 10, 12, 15, 19, 20 are for graduates and undergraduates; Courses 9, 11, 13, 14, 16, 17, 18 are primarily for graduates, though undergraduates of exceptional ability are admitted by special permission.

Professor BEMAN:—

5, 18. Solid Analytical Geometry.

Chas. Smith and Frost, with references to Salmon.—

Two hours a week, both semesters.

9–17. Differential Equations.

Forsyth, with references to Johnson and Boole.—

Three hours a week, first semester; two hours, second semester.

10. Quaternions.

Hardy, with references to Tait and Hamilton.—*Three hours a week, second semester.*

13. Mathematical Reading.

This course is designed to give graduate students an opportunity to read standard mathematical works under the direction of the Faculty. Jordan's *Cours d'Analyse* will be read in 1892–93.—*Three hours a week, both semesters.*

19, 20. Teachers' Seminary.

Critical study of certain text-books in algebra and geometry, together with the discussion of methods and aims in mathematical teaching, sketches of the history of mathematics, lists of books for teachers, etc.—*Two hours a week, both semesters.*

Assistant Professor COLE:—

7, 8. Modern Geometry.

These two courses are devoted to a systematic treatment of the elements of modern coördinate geometry as a basis for the theory of higher curves and of surfaces on the one hand, and of invariants on the other.—*Three hours a week, first semester; two hours, second semester.*

11, 14. Theory of Complex Numbers.

These courses lead to the theory of the elliptic and other transcendental functions. Their subject matter is the logical development of the conception of the complex (imaginary) quantities, and the consideration of the

properties of functions of a complex variable.—*Three hours a week, first semester; two hours, second semester.*

Assistant Professor ZIWET:—

15, 16. Advanced Mechanics.

These courses are designed for students who have taken a preliminary course in mechanics involving the elementary applications of the calculus. Course 15 (second semester) is mainly devoted to the theory of the potential and its applications; course 16 (first semester) to the theory of elasticity.—*Two hours a week, both semesters.*

Dr. MARKLEY:—

12. Modern Higher Algebra.

This course is based upon Burnside and Panton's Theory of Equations.—*Three hours a week, second semester.*

PHYSICS.

The following advanced courses presuppose about two years of collegiate work in physics, viz., one year, five hours a week, upon mechanics, sound, light, electricity, magnetism, and heat; a beginner's course in laboratory work, and a course in electrical units and measurements, combining theoretical instruction with laboratory work. No courses are offered specially for graduates, but graduates who are qualified by their previous training will have an opportunity for original research in the laboratory, under the immediate supervision of the Director and his assistants.

Professor CARHART:—

13. The Alternate Current Transformer: Fleming.
Two hours a week, first semester.

Professor CARHART and Mr. ROWE:—

8. Dynamo-Electric Machinery.

Lectures (by Professor CARHART) *two hours a week, with laboratory work, either once or twice a week, first semester.*

12. Advanced Laboratory Work in Electricity and Magnetism.

Two hours a week, second semester.

Professor CARHART and Mr. REED:—

11. Theory of Light: Preston.

Recitations, *two hours a week*, and laboratory work, *twice a week, first semester.*

Assistant Professor PATTERSON:—

7, 10. Mathematical Electricity: Mascart and Joubert.

Three hours a week, throughout the year.

Assistant Professor PATTERSON and Mr. ROWE:—

9. Distribution of Electricity and Photometry of Electric Lamps.

Lectures, two hours a week; laboratory work, twice a week, second semester.

GENERAL CHEMISTRY.

The following advanced courses presuppose about two years' collegiate study of general, analytical and organic chemistry, comprising both theoretical instruction and laboratory practice. The research laboratory is intended primarily for graduate students. Courses 5 and 8 are for graduates and advanced undergraduates, but graduates taking these courses will receive special instruction of one hour a week. Courses 7 and 7a are for graduates exclusively. Students taking general chemistry as a major study are required to have a reading knowledge of German and French.

Professor FREER:—

5. Theoretical Chemistry of Recent Years.

Lectures and readings in the history of chemistry.—Two (three) hours a week, first semester.

6. German Chemical Literature.

Two hours a week, second semester.

7, 7a. Laboratory Research.

The work may be in organic or inorganic general chemistry. Students taking organic work must have a good knowledge of organic preparations.—*Hours arranged with instructor, throughout the year.*

Mr. HIGLEY:—

8. The Rarer Chemical Elements.

Lectures.—Two (three) hours a week, second semester.

9. Laboratory Research in Inorganic General Chemistry.

Hours to be arranged; second semester.

ANALYTICAL CHEMISTRY AND ORGANIC CHEMISTRY.

Preparation for graduate work in these subjects requires from two to four semesters of laboratory study. Graduates who have not had this preparation can secure it by means of the lower courses, which are not here enumerated. Candidates for a higher degree who take chemistry as a major study must be prepared to enter upon an original investigation; for those who take chemistry as a minor study the preliminary requirement is somewhat lower. Each application is judged on its individual merits in view of the applicant's purposes and collateral qualifications, and the line of work to be selected. The student carries on experimentation in the laboratory, with consultation of authorities in the library, all under the direction of his instructor to whom he presents formal written reports. In the research courses the final reports are to be in form for publication. The following courses are open to such as are prepared for them, but, in general, the permission of the instructor will need to be secured in each case.

Professor PRESCOTT:—

11a. Organic Preparations.

Laboratory work.—*Hours to be arranged; throughout the year.*

12. Ultimate Organic Analysis and Synthetic Preparations.

Laboratory work.—*Hours to be arranged; throughout the year.*

19. Organic Synthesis.

Laboratory and library studies, with seminary work in a class pursuing related investigations. The seminary work consists of partial reports upon experimentation and literature, with informal lectures and discussions of the subjects involved.—*Hours to be arranged; first semester.*

19a. Organic Synthesis.

Continuation of Course 19.—*Hours to be arranged; throughout the year.*

17, 18. Original Investigations.

Laboratory and library work with seminary exercises.—*Hours to be arranged; throughout the year.*

Professor JOHNSON:—

2. Advanced Qualitative Analysis.

With research in chemical reactions and library work.—*Hours to be arranged; second semester.*

22, 23. Original Investigations in Applied Chemistry and Chemical Reactions.

Hours to be arranged; throughout the year.

Assistant Professor CAMPBELL:—

5. Advanced Qualitative Analysis.

Hours to be arranged; either first or second semester.

24, 25. Original Investigations in Quantitative Analysis and its Applications.

Hours to be arranged; throughout the year.

HYGIENE AND PHYSIOLOGICAL CHEMISTRY.

The following advanced courses presuppose that the student taking them is prepared for original research.

Professor VAUGHAN:—

7, 8. Original Research on the Causation of Disease.

Hours to be arranged, either first or second semester.

Assistant Professor NOVY:—

6. Advanced Physiological Chemistry.

Laboratory work and reading.—*Hours to be arranged, either first or second semester.*

ASTRONOMY.

The lower courses provide instruction in general, spherical and practical astronomy and in observatory practice.

Professor HALL:—

6, 7. Theoretical Astronomy.

Five hours a week, throughout the year.

11. Mathematical Theories of Planetary Motions.

Two hours a week, second semester.

Professor HALL and Mr. ALLOR:—

9. Extended Practical Course.

Hours (at the observatory) to be arranged; first semester.

MINERALOGY.

The higher work in mineralogy presupposes an elementary knowledge of chemistry and an introductory course in mineralogy, combining theoretical instruction with practice in determining minerals.

Professor PETTEE :—

3. Advanced Mineralogy.

Hours to be arranged ; first or second semester.

GEOLOGY.

The following courses presuppose at least one year's collegiate study of geology, comprising the elements of general geology, lithological, structural, dynamical and historical, and also an elementary course in general palæontology.

Professor RUSSELL :—

5, 6. Physical and Glacial Geology.

Two hours a week, throughout the year.

4. Palæontological Investigations.

Laboratory work with reading and such instruction as the student may require.—*Hours to be arranged ; second semester.*

Professor PETTEE :—

8. Economic Geology.

Two hours a week, first semester.

ZOÖLOGY.

I. Systematic Zoölogy.

The following courses presuppose about one year's collegiate study of systematic zoölogy, both vertebrate and invertebrate, and a course combining lectures and laboratory practice in the identification of vertebrates.

Professor STEERE :—

4. Independent Work in the Systematic Study of Vertebrates.

Hours to be arranged ; either first or second semester.

5. Special Study of Invertebrate Groups.

Hours to be arranged ; first semester.

6. Development of Species and Theory of Classification.

Two hours a week, first semester.

II. Animal Morphology.

The following courses presuppose a year's work in general biology, and those in vertebrate morphology a year's work in

mammalian anatomy (the cat) including histology. Graduate students have an opportunity to do research work on special problems under the daily supervision of the Director of the laboratory. They also participate in the work of the Journal Club.

Professor REIGHARD:—

D. Comparative Anatomy of Vertebrates.

Lectures *two hours a week*, laboratory work *forenoons*, *first semester*.

E. Comparative Embryology of Vertebrates.

Lectures *two hours a week*, laboratory work (embryology of amphibia, chick and rabbit) *forenoons*, *second semester*.

F, G. Original Work in Animal Morphology.

Graduate course.—*Hours to be arranged; throughout the year.*

I¹, I². Current Literature of Animal Morphology.

The class will constitute a Journal Club to meet once a week for one or two hours.

Dr. WARD:—

A, B². Morphology of Invertebrates.

Comparative Anatomy and Embryology. Lectures and laboratory work.—*Three hours a week, throughout the year.*

BOTANY.

Graduates and undergraduate students who have taken a full year's work in general biology or the corresponding elementary courses in botany are offered advanced and special courses in botany as follows:

Professor SPALDING:—

5. Cryptogamic Botany.

Developmental history of the lower cryptogams. Lectures and laboratory work.—*Three hours a week, first semester.*

5a. Continuation of Course 5.

Two hours a week, first semester.

6. Morphology and Classification of Flowering Plants and the Higher Cryptogams.

Lectures, laboratory work and reading.—*Three hours a week, second semester.*

6a. Continuation of Course 6.

Two hours a week, second semester.

7. Investigations. Structure and Development of Fungi.

Laboratory work with reading.—Hours to be arranged; first semester.

8. Investigations. Vegetable Physiology.

Experimental laboratory work and reading.—Hours to be arranged; second semester.

PHYSIOLOGY.

Advanced instruction in physiology will be given by Professor Lombard, but the announcement of courses is necessarily deferred until the opening of the University in October.

MECHANICAL ENGINEERING.

Nearly all the instruction provided in this department consists of courses that are required for the degree of B. S. in Mechanical Engineering; but the following courses offer an opportunity for graduates to do research work for a second degree under the immediate supervision of the Director of the Engineering Laboratory. In each case the graduate will receive special advanced instruction suited to his individual needs.

Professor COOLEY:—

13. Machinery and Mill Work: advanced course.

A study of the installation of plants of machinery with comparison of the results obtained in practice from different systems.—*Two hours a week, second semester.*

Professor COOLEY and Assistant Professor WAGNER:—

15. Experimental Laboratory Work: advanced course.

Measurements of power and efficiency of secondary machines.—*Hours to be arranged, first semester.*

16. Steam Engineering: advanced course.

Devoted largely to testing steam machinery and reporting on the tests.—*Hours to be arranged, second semester.*

Assistant Professor WAGNER:—

9. Thermo-Dynamics: advanced course.

Hot air and gas engines, air compressors and refrigerating machines. The work consists largely in a com-

parison of experimental data with the deductions derived from theory.—*Two hours a week, first semester.*

MARINE ENGINEERING.

The following courses will ordinarily be found adapted to the needs of graduate students. The instruction comprises a study of marine steam engines and propelling instruments, the hydraulics of ship-building, buoyancy, metacentre, stability and trim, weight and centre of gravity, waves and resistance, propulsion by sails and steam engines, laying-off and taking-off, and other topics.

Professor COOLEY :—

1. Naval Architecture.
Hours to be arranged, first semester.
2. Marine Engines.
Hours to be arranged, second semester.
3. Ship-Building.
Hours to be arranged, second semester.

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UNIVERSITY OF MICHIGAN

ANNOUNCEMENT

OF

THE GRADUATE SCHOOL

1893-1894

DEPARTMENT OF LITERATURE, SCIENCE, AND THE ARTS

ANN ARBOR, MICHIGAN
PUBLISHED BY THE UNIVERSITY
1893

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• 1893

CALENDAR.

1893.

- Sept. 25-29. *Examination for Admission to the Department of Literature, Science, and the Arts.*
- Oct. 1. FIRST SEMESTER BEGINS IN ALL DEPARTMENTS OF THE UNIVERSITY.
- Nov. —. Thanksgiving Recess of three days, beginning Tuesday evening, in all Departments.
- Dec. 22. (Evening.) Holiday Vacation begins in all Departments.

1894.

- Jan. 9. Exercises resumed.
- Feb. 16. (Evening.) FIRST SEMESTER CLOSES.
- Feb. 19. SECOND SEMESTER BEGINS.
- April 13. (Evening.) Recess begins, ending April 24 (evening).
- June 28. COMMENCEMENT IN ALL DEPARTMENTS.

FACULTY
OF THE
DEPARTMENT OF LITERATURE, SCIENCE, AND THE ARTS.

Professors and Assistant Professors.

- JAMES B. ANGELL, LL.D., *President.**
ALBERT B. PRESCOTT, PH.D., M.D., *Director of the Chemical Laboratory, and Professor of Organic Chemistry.*
REV. MARTIN L. D'OUGE, LL.D., *Dean, and Professor of the Greek Language and Literature.*
CHARLES E. GREENE, A.M., C.E., *Professor of Civil Engineering.*
WILLIAM H. PETTEE, A.M., *Professor of Mineralogy, Economic Geology, and Mining Engineering.*
JOSEPH B. STEERE, PH.D., *Professor of Zoölogy.*
EDWARD L. WALTER, PH.D., *Professor of Romance Languages and Literatures.*
ISAAC N. DEMMON, A.M., *Professor of English and Rhetoric.*
ALBERT H. PATTENGILL, A.M., *Professor of Greek.*
MORTIMER E. COOLEY, M.E., *Professor of Mechanical Engineering.*
WOOSTER W. BEMAN, A.M., *Professor of Mathematics.*
VICTOR C. VAUGHAN, PH.D., M.D., *Professor of Hygiene and Physiological Chemistry, and Director of the Hygienic Laboratory.*
CHARLES S. DENISON, M.S., C.E., *Professor of Descriptive Geometry, Stereotomy, and Drawing.*
HENRY S. CARHART, A.M., *Professor of Physics, and Director of the Physical Laboratory.*
RAYMOND C. DAVIS, A.M., *Librarian.*
VOLNEY M. SPALDING, A.B., *Professor of Botany.*
HENRY C. ADAMS, PH.D., *Professor of Political Economy and Finance.*
CALVIN THOMAS, A.M., *Professor of Germanic Languages and Literatures.*
BURKE A. HINSDALE, PH.D., *Professor of the Science and the Art of Teaching.*
RICHARD HUDSON, A.M., *Professor of History.*
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* The President lectures upon International Law and the History of Treaties.

ALBERT A. STANLEY, A.M., *Professor of Music.*

JOHN DEWEY, PH.D., *Professor of Philosophy.*

FRANCIS W. KELSEY, PH.D., *Professor of the Latin Language and Literature.*

OTIS C. JOHNSON, PH.C., A.M., *Professor of Applied Chemistry.*

PAUL C. FREER, PH.D., M.D., *Professor of General Chemistry.*

*ANDREW C. McLAUGHLIN, A.B., LL.B., *Professor of American History.*

JOSEPH B. DAVIS, C.E., *Professor of Geodesy and Surveying.*

ASAPH HALL, JR., PH.D., *Professor of Astronomy, and Director of the Observatory.*

ISRAEL C. RUSSELL, M.S., C.E., *Professor of Geology.*

WARREN P. LOMBARD, A.B., M.D., *Professor of Physiology and Histology.*

JACOB E. REIGHARD, PH.B., *Professor of Animal Morphology.*

THOMAS C. TRUEBLOOD, A.M., *Professor of Elocution and Oratory.*

JOHN C. ROLFE, PH.D., *Professor of Latin.*

PAUL R. DE PONT, A.B., B.S., *Registrar, and Assistant Professor of French.*

CLARENCE G. TAYLOR, B.S., *Superintendent of Shops in Engineering Laboratory.*

GEORGE HEMPL, PH.D., *Assistant Professor of English.*

EDWARD D. CAMPBELL, B.S., *Assistant Professor of Metallurgy.*

JOSEPH H. DRAKE, A.B., *Assistant Professor of Latin.*

FRED N. SCOTT, PH.D., *Assistant Professor of Rhetoric.*

FRANK N. COLE, PH.D., *Assistant Professor of Mathematics.*

FREDERICK G. NOVY, M.D., Sc.D., *Assistant Professor of Hygiene and Physiological Chemistry.*

ALEXANDER ZIWET, C.E., *Assistant Professor of Mathematics.*

GEORGE W. PATTERSON, JR., A.B., S.B., *Assistant Professor of Physics.*

GEORGE A. HENCH, PH.D., *Assistant Professor of German.*

FRANK C. WAGNER, A.M., B.S., *Assistant Professor of Mechanical Engineering.*

GOTTHELF C. HUBER, M.D., *Assistant Professor of Histology.*

FRED M. TAYLOR, PH.D., *Assistant Professor of Political Economy and Finance.*

ALVISO B. STEVENS, PH.C., *Assistant Professor of Pharmacy.*

DAVID E. SPENCER, A.M., *Acting Assistant Professor of History.*

WILLIAM M. ARNOLT, PH.D., *Acting Assistant Professor of Oriental Languages.*

*Absent on leave in 1893-94.

Instructors and Assistants.

- JOSEPH L. MARKLEY, PH.D., *Instructor in Mathematics.*
WILLARD K. CLEMENT, PH.D., *Instructor in Latin.*
MORITZ LEVI, A.B., *Instructor in French.*
FRED MORLEY, C.E., *Instructor in Descriptive Geometry and Drawing.*
ELMER A. LYMAN, A.B., *Instructor in Mathematics.*
HIRAM A. SOBER, A.B. *Instructor in Latin.*
GEGRGE O. HIGLEY, B.S., *Instructor in General Chemistry.*
GEORGE H. MEAD, A.B., *Instructor in Philosophy.*
ALFRED H. LLOYD, A.M., *Instructor in Philosophy.*
RAYMOND L. WEEKS, A.M., *Instructor in French.*
JONATHAN A. C. HILDNER, A.B., *Instructor in German.*
HERMAN V. AMES, PH.D., *Instructor in History.*
GEORGE REBEC, PH.B., *Instructor in English.*
ERNST VOSS, *Instructor in German.*
DAVID M. LICHTY, M.S., *Instructor in General Chemistry.*
GEORGE H. ROWE, B.S., *Instructor in Electrical Engineering.*
JOHN O. REED, PH.B., *Instructor in Physics.*
BENJAMIN P. BOURLAND, A.M., *Instructor in French.*
JOHN R. EFFINGER, PH.B., *Instructor in French.*
LORENZO N. JOHNSON, A.M., *Instructor in Botany.*
HERBERT F. DE COU, A.M., *Instructor in Greek and Sanskrit.*
ELMER L. ALLOR, B.S., *Instructor in Astronomy.*
HENRY B. WARD, PH.D., *Instructor in Morphology.*
ERNST H. MENSEL, A.M., *Instructor in German.*
LAWRENCE MCLOUTH, A.B., *Instructor in German.*
GEORGE F. METZLER, PH.D., *Instructor in Mathematics.*
EARLE W. DOW, A.B., *Instructor in History.*
POMEROY LADUE, B.S., *Instructor in Mathematics.*
EUGENE LESER, PH.D., *Instructor in French.*
ALICE L. HUNT, *Assistant in Drawing.*
MOSES GOMBERG, M.S., *Assistant in Organic Chemistry.*
BERNHARD C. HESSE, PH.C., *Assistant in Qualitative Analysis.*
EUGENE H. ROBERTSON, PH.B., *Assistant in Physiological Chemistry.*
CHARLES H. COOLEY, A.B., *Assistant in Political Economy.*
FRANK H. DIXON, PH.B., *Assistant in Political Economy.*
WILLIAM A. KICKLAND, B.S., *Assistant in Vertebrate Morphology.*
PAUL H. SEYMOUR, B.S., *Assistant in General Chemistry.*

ANNOUNCEMENT OF THE GRADUATE SCHOOL.

GENERAL INFORMATION.

The University of Michigan.

The University of Michigan is a part of the educational system of the State, and derives from the State, in one way or another, the greater part of its revenue. The University comprises the Department of Literature, Science, and the Arts, and five professional schools, each of which has its own Faculty and issues each year a separate departmental Announcement. The various faculties aggregated, in 1892-93, one hundred and eighteen officers of instruction, besides numerous assistants, some of whom participate in the work of teaching. Nearly twenty-eight hundred students, representing forty-four States and Territories, and seventeen foreign countries, were in attendance.

The Department of Literature, Science, and the Arts.

The Department of Literature, Science, and the Arts combines under one organization the different lines of work that are often represented elsewhere by the names college, scientific school, and school of technology. Its Faculty numbered, in 1892-93, eighty-two teachers. The students in attendance numbered nearly fifteen hundred, of whom sixty-two were graduates. The presence of such a number of graduate students, taken with the fact that high specialization of work is not uncommon among undergraduates, tends to create a genuine university atmosphere, and to assure the advanced student of intellectual comradeship.

The Libraries.

The various libraries of the University contain about 82,500 volumes, and include a number of important special collections. Among these are the McMillan Shakespeare Library, 3,494 volumes; the Parsons Library (political science), 4,325 volumes; the Hagerman Collection (history and political science), 2,600 volumes, and a Goethe Library of 848 volumes. The general reading room seats two hundred and sixteen

readers, and separate rooms are provided for advanced students to work in with the necessary books close at hand. Under certain restrictions graduate students have access to the book rooms. The library takes about two hundred periodicals, and is open, in term time, eleven and one-half hours daily, except on Sundays and legal holidays.

The Laboratories.

The University has an observatory and twelve laboratories more or less fully equipped for routine instruction and for original research. These are (omitting those connected exclusively with the work of the Medical and Dental Schools): the Botanical, Chemical, Engineering, Geological, Histological, Hygienic, Physical, Physiological, Psychological, and Zoölogical. For a fuller account of these laboratories and their various resources, as also of the University collections for the study of art, archæology, ethnology, mineralogy, palæontology, systematic zoölogy, etc., consult the annual Calendar, which may be had gratis on application to Mr. James H. Wade, Secretary of the University.

The Scientific Societies.

There are connected with the University a number of voluntary scientific organizations which add not a little to the graduate student's opportunity for scientific training. The membership of these societies consists usually of University teachers and advanced students who are pursuing a common specialty. They are variously organized and meet weekly, fortnightly, or monthly, as the case may be, for the reading and discussion of formal papers, for reports upon observation and experiment, reviews of recent technical literature, etc. Some of them do work of a highly creditable and stimulating character. The existing associations of this character are the Biological Society, Chemical Society, Engineering Society, Geological Society, Mathematical Club, Mathematical Society, Philological Society, Philosophical Society, and Political Science Association.

ORGANIZATION OF GRADUATE WORK.

The Graduate School.

The Graduate School was organized in the spring of 1892 in connection with the Department of Literature, Science, and the Arts. Its purpose is to bring into increased prominence the numerous advanced courses offered in that Department,—courses that have developed during the past few years from the continual extension of the elective system,—and to recognize and announce them as something distinct from the work of an ordinary college course. It aims to make provision for a more systematic and efficient administration of this higher work, and, so

far as possible, for the separate instruction of graduate students. It also aims to lay foundations for the future development of university (as distinguished from collegiate) work. During the year 1892-93 the management of the School was entrusted to an Administrative Council, consisting of the heads of departments of instruction, with the President of the University as chairman.

The regulations of the University respecting graduate work, that were formerly in force, have been modified in a few particulars by the Council, and it is possible that still further changes may be made in the year to come. The more important of these regulations are explained in the pages that follow.

The University System.

Every graduate student who is a candidate for a higher degree, works upon the so-called 'university system,' the essential features of which are specialization of study, a final examination, and a thesis. The student selects a 'major study' and, in general, two 'minor studies,' his selection being subject, however, to the approval of the Council. When the choice has been made and approved, the student's work is henceforth under the immediate supervision of a committee consisting of those professors who have charge of the studies chosen, the one having charge of the major study being chairman. This committee arrange a course of study suited to the desires, needs, and previous attainments of the student, assist him in the choice of a subject for a thesis, pass judgment upon his thesis when it is written, conduct his examination and, if he passes, report him to the Council as worthy of the degree sought. The nature of the work prescribed, and of the committee's oversight, varies more or less according to the subjects chosen, the degree sought, and the previous attainments of the student. The work may consist of attendance upon certain specified courses, of reading to be done privately and reported upon, or of an original research to be carried on more or less independently. The requirement of a thesis is sometimes waived in the case of a candidate for a *Master's* degree. It may be added also that for the Master's degree the Council may, at their discretion, approve a course of study which does not confine the candidate rigorously to a major and two minor studies.

Graduate students who do not wish to work for a higher degree are admitted to any course offered in the Department upon satisfying the professor in charge that they are qualified to pursue the work to advantage.

THE HIGHER DEGREES.

Degrees Conferred.

The higher degrees conferred in the Department of Literature, Science, and the Arts are those of Master of Arts, Master of Science, Master of Phi-

losophy, Master of Letters, Doctor of Philosophy, Doctor of Science, Doctor of Letters, Civil Engineer, Mechanical Engineer, Mining Engineer, and Electrical Engineer.

The Masters' Degrees.

A Bachelor of this University, or of any other reputable university or college, may become a candidate for the corresponding Master's degree, and may be recommended for the degree after one year's residence at the University, provided he pass a satisfactory examination on the course of study prescribed by his committee. A thesis may, or may not, be included in the requirements for the degree, as the committee in charge of the student's work may determine.

The practice of allowing graduates of this University to pursue studies *in absentia* as candidates for a Master's degree, has been discontinued.

Students properly qualified may be permitted to pursue at the same time studies for a Master's degree, and studies in any of the professional schools, on condition that the term of study and residence in this Department be extended to cover two years instead of one.

The Doctors' Degrees.

The Doctors' degrees are conferred only on persons who have previously received a Bachelor's degree, either here or at some other reputable university or college, and also during residence here have shown special proficiency in some one branch of study, and good attainments in at least two others, and have presented a thesis evincing the power of independent research. It is not intended that the Doctor's degree shall be won merely by faithful and industrious work for a prescribed time in some assigned course of study, and no definite term of required residence can be specified; but it is the practice to require at least one full year's residence of candidates that have already earned a Master's degree, and at least two full years of candidates that have taken only a Bachelor's degree. The degree of Doctor of Philosophy is open to persons that have received the degree of Bachelor of Arts, or Bachelor of Philosophy; the degree of Doctor of Science to persons who have received the degree of Bachelor of Science, and the degree of Doctor of Letters to persons who have received the degree of Bachelor of Letters.

The Higher Degrees in Engineering.

The degree of Civil Engineer may be conferred upon Bachelors of Science of this University who have taken the degree for a course in Civil Engineering, if they furnish satisfactory evidence that they have pursued further technical studies for at least one year, and, in addition,

have been engaged in professional work, in positions of responsibility, for another year. The first of the above requirements may be satisfied by pursuing at the University, under the direction of the Council, a prescribed course of study for an amount of time, not necessarily consecutive, equivalent to an academic year. If the candidate does not reside at the University, his course of study must be approved in advance by the Professor of Civil Engineering, and he must prepare a satisfactory thesis on some engineering topic, to be presented, together with a detailed account of his professional work, one month, at least, before the annual Commencement at which he expects to secure the degree.

The conditions on which the degrees of Mechanical Engineer, Mining Engineer, and Electrical Engineer are conferred, as second degrees, upon Bachelors of Science of this University who have taken the degree for a course in Mechanical Engineering, Mining Engineering, or Electrical Engineering, are analogous in character to those prescribed for the degree of Civil Engineer.

Special Regulations Relating to the Higher Degrees.

1. Applicants for an advanced degree, whether resident or non-resident, are required to announce to the Council, through the President, as early as the fifteenth of October, the particular branches of study to which they wish to give special attention. The supervision of their work will then be entrusted to the proper committee.

2. The subject of the thesis must be announced to the President as early as the first of December of the college year in which the applicant expects to take the degree.

3. It is expected in the case of every applicant that the thesis be upon a subject requiring research.

4. The thesis must be completed and put into the hands of the chairman of the proper committee as early as the first of May of the year in which the applicant expects to take the degree.

5. The thesis must be prepared for close scrutiny with reference not only to its technical merits, but also to its merits as a specimen of literary workmanship. It must be preceded by an analytical table of contents, and a carefully prepared account of the authorities made use of.

6. The thesis must be read and defended in public at such time as the Council may appoint; and, in case of a Master's degree, a bound copy, either written or printed, must be deposited in the University library.

7. Candidates for the degree of Doctor of Philosophy, Doctor of Science, or Doctor of Letters, in case of the acceptance of their theses, are also required to have the accepted theses printed, and to present twenty-five copies of the same to the University library, unless by special vote of the Council a smaller number is deemed sufficient.

ADMISSION AND REGISTRATION.

All applicants for admission must first report to the President and present their credentials.

The privileges of the Graduate School are open to graduates of the Department of Literature, Science, and the Arts of this University, and to graduates of other universities and colleges who satisfy the Council that they are qualified to pursue with profit the advanced courses of study offered in the school.

Graduates of institutions where the undergraduate courses of study are not substantially equivalent to the course prescribed at this University will ordinarily be required to do an additional amount of undergraduate work, or to prolong their term of residence, before being admitted to full candidacy for a higher degree.

Graduates of this University, or of other institutions, who do not wish to become candidates for a degree, may be admitted and registered as special resident graduates.

Graduates of other institutions who are candidates for a bachelor's degree in the Department of Literature, Science, and the Arts, are not registered in the Graduate School.

FEEES AND EXPENSES.

Matriculation Fee.—Every student before entering any department of the University is required to pay a matriculation fee. This fee, which, for citizens of Michigan, is ten dollars, and for those who come from any other State or country, twenty-five dollars, is paid but once, and entitles the student to the privileges of permanent membership in the University. There is no fee for tuition.

Annual Fee.—In addition to the matriculation fee, every student has to pay an annual fee for incidental expenses. This fee is paid the first year of residence at the University, and every year of residence thereafter. Resident graduates are required to pay the same annual fee as undergraduates. The annual fee in the Department of Literature, Science, and the Arts is, for Michigan students, twenty dollars; for all others, thirty dollars.

The matriculation fee and the annual fee must be paid at the beginning of the college year. A by-law of the Board of Regents provides that no student or graduate shall be allowed to enjoy the privileges of the University until he has paid all fees that are due.

Laboratory Expenses.—Students who pursue laboratory courses of study are required to pay for the materials and apparatus actually consumed by them. The deposits required in advance are different in the

different courses, ranging from one to twenty dollars. The laboratory expenses of students will vary with their prudence and economy. Experience has shown that in the chemical laboratory the average expense for all courses is about one dollar and twenty cents a week.

Diploma Fee.—The fee for the diploma given on graduation is ten dollars, and the by-laws of the Board of Regents prescribe that no person shall be recommended for a degree until he has paid all dues, including the fee for diploma.

Other Expenses.—Students obtain board and lodging in private families for from three to five dollars a week. Clubs are also formed in which the cost of board is from one dollar and a half to two dollars and a half a week. Room rent varies from one dollar to three dollars a week for each student. The annual expenses of students, including clothing and incidentals, are, on the average, about three hundred and seventy dollars.

There are no dormitories, no commons, and no stipends (with the exception of one fellowship) connected with the University. Students on arriving in Ann Arbor can obtain information in regard to rooms and board by calling at the Steward's office.

COURSES OF INSTRUCTION.

The following list of advanced courses does not attempt in all cases to discriminate graduate from undergraduate instruction; the reason being that the possession of a Bachelor's degree may mean much or little as regards a student's proficiency in a particular subject. With a few exceptions, the courses here mentioned all presuppose a somewhat extensive preliminary study of the subject, a study covering from one to six years, according to the circumstances. In most instances the attempt is made to indicate, in terms of both time and work, the amount of preparation required for entrance upon the courses described. Many of the courses are advanced electives which are open to undergraduates, but have been shown by experience to be suited to the needs of many graduates. Different departments of instruction have adopted different modes of announcing and explaining their work, but, in general, the courses given by any instructor are grouped under his name. For further information reference may be made directly to the head of the department concerned.

GREEK.

The courses here announced presuppose, in general, four years' previous study of Greek, viz., the usual preparatory course of two years, and two years of collegiate study devoted to the history of Greek literature and to reading from Lysias, Xenophon, Homer, Demosthenes, the Tragic Poets, and Aristophanes.

In addition to the courses named below, instruction will be provided in Hellenistic Greek, intended especially for those who are looking forward to the work of the Christian ministry. The precise nature of this instruction cannot be stated at the time this announcement is printed.

A. PRIMARILY FOR GRADUATES.

Professor D'OUGE:—

The Greek Dialects.

The fragments of Greek lyric poetry and the most important dialectic inscriptions will be read. Bergk's *Anthologia Lyrica* and Cauer's *Delectus Inscriptionum Græcarum* will be the text-books.—*Two hours a week, second semester.*

Aristotle's Athenian Constitution.

In connection with this text topics dealing with the legal and political antiquities of the Athenians will be assigned for individual investigation and discussion.—*Two hours a week, first semester.*

Mr. DE COU:—

Introduction to Greek Epigraphy and Reading of Inscriptions.

Two hours a week, first semester.

B. FOR GRADUATES AND UNDERGRADUATES.

Professor D'OUGE:—

Teachers' Seminary.

This course is intended to give students who expect to teach Greek training in teaching the elements of inflection and syntax. In the first semester, lectures will be given on the chief results of the modern comparative treatment of Greek sounds and inflections. In the second semester, the course will include the writing of Greek Prose, and a discussion of the principles of Greek Syntax.—*Two hours a week, throughout the year.*

Seminary in Tragedy.

The *Agamemnon* of Aeschylus and the *Philoctetes* of Sophocles will be read and interpreted by each member of the class in turn. The reading will be accompanied by a discussion of the principles of Greek dramatic art, and by a study of the important points of textual criticism.—*Two hours a week, first semester.*

The History of Greek Art from the beginnings to the Roman Period.

Von Reber's *History of Ancient Art* and Collignon's *Manual of*

Greek Archæology will be made the basis of a more general study.—
Three hours a week, first semester.

Aristotle's Ethics, Books I–IV and X.

Two hours a week, second semester.

Selections from Lucian.

Two hours a week, first semester.

Professor PATTENGILL:—

Legal Orations of Demosthenes and Isaeus, with a study
of Attic law and judicial procedure.

Two hours a week, first semester.

The Minor Greek Poets.

Selections from the Homeric hymns, Callimachus, Musaeus, and
the Anthology.—*Two hours a week, second semester.*

Studies in Euripides.

Two hours a week, second semester.

Mr. DE COU:—

Modern Greek.

Grammatical peculiarities, and selections from Modern Greek
writers.—*Two hours a week, second semester.*

LATIN.

The courses here announced presuppose, in general, six years' previous
study of Latin, viz., the usual preparatory course of four years, and two
years of collegiate study devoted to Livy, Horace, Terence, sight reading,
Latin composition, and the systematic study of Roman literature.

A. PRIMARILY FOR GRADUATES.

Professor KELSEY*:—

Seminary in Roman Archæology.

Two hours a week, throughout the year.

Roman Epigraphy.

Two hours a week, second semester.

Professor ROLFE:—

Seminary in Latin Philology.

Two hours a week, throughout the year.

*Owing to Professor Kelsey's absence in Europe the courses announced to be
given by him are subject to modification. The general lines indicated will be followed,
and due notice of changes will be given.

The Latin FACULTY:—**Reports on Periodical Literature.**

The professors and instructors meet regularly for reports on the contents of the technical journals. Graduate students are admitted to a share in this work.—*One hour a week, throughout the year.*

B. FOR GRADUATES AND UNDERGRADUATES.**Professor KELSEY*:—****Introduction to Classical Philology.**

Lectures on the history, methods, and bibliography of classical philology.—*Three hours a week, first semester.*

Introduction to Roman Archæology.

Lectures on the elements of Roman archæology; the topography and architectural history of Rome, and sculpture and painting in the Roman period.—*Two hours a week, second semester.*

Lucretius.

Books I, II, III, V.—*Two hours a week, first semester.*

Teachers' Seminary.

Critical study of Caesar, Cicero, and Vergil, with pedagogical discussion and practice.—*Two hours a week, throughout the year.*

Professor ROLFE:—**Latin Writing.**

An advanced course, with studies in Latin Style.—*Two hours a week, second semester.*

Latin Grammar.

Three hours a week, throughout the year. An additional hour will be given to graduate students for the direction of private reading.

Advanced course in reading.

Two hours a week, second semester.

Assistant Professor DRAKE:—**Tacitus.**

Lectures and recitations.—*Two hours a week, first semester.*

Seminary in Roman History.

This course is open only to students who have completed Professor Kelsey's undergraduate course in Roman Archæology.—*Two hours a week, second semester.*

SEMITIC LANGUAGES, AND SANSKRIT.

Opportunity for the study of Hebrew and other Semitic languages, and of Sanskrit, will be provided, but the details of the courses cannot be given at the time this announcement is issued.

* See foot note on previous page.

FRENCH.

Students will not be considered as taking graduate work in French, whether graduates of this University or of any other institution, who have not had the equivalent of at least Courses 1, 2, 3, 6, 7, 8, 20, and 21, as given in the undergraduate department of the University and described in the University Calendar for 1892-93, pages 53-55. These courses include grammar and composition, the reading of classic and modern prose, and the classic and modern drama.

Graduate work is either chiefly literary or chiefly linguistic, but it is expected that for the Doctor's degree at least, and it is advised that for the Master's degree as well, some work shall be done in both directions.

For students who choose to direct their work chiefly to the literature, opportunity will be given in the *first semester* of 1893-94 to study the Eighteenth Century dramatists, the Sixteenth Century literature, and some of the leading French philosophical writers; in the *second semester*, the pre-revolutionary literature, Voltaire, Montesquieu, Rousseau, etc., the romantic movement at the beginning of the present century, and the satirical spirit in French literature. Private work will be assigned when it is thought desirable by the Professor in charge.

The oldest French literature will be studied in connection with the study of Old French, which will be continued *throughout the year*.

A teachers' course in French will be open to candidates for a Master's degree who intend to teach that language.

The courses in French will be given by, or under the direction of, Professor WALTER.

ITALIAN.

Students will not be considered as taking graduate work in Italian, who have not had the equivalent of Courses 1 and 2 as described in the University Calendar for 1892-93, pages 55 and 56. In 1893-94 courses in Dante's *Divina Commedia* and *Vita Nuova* will be offered.

The courses in Italian will be given by, or under the direction of, Professor WALTER.

SPANISH.

Students will not be considered as taking graduate work in Spanish, who have not had the equivalent of Courses 1 and 2 as described in the University Calendar for 1892-93, page 56. In 1893-94 the drama of Lope and Calderon will be offered.

The courses in Spanish will be given by, or under the direction of, Professor WALTER.

GERMAN.

The undergraduate courses, not here mentioned, provide for four years' study, five hours a week. Considerably less than that, however, is a satisfactory preparation for the courses described below:

Professor THOMAS:—

Goethe's Faust.

Recitations and lectures upon the interpretation of the text, Thomas's edition being used for Part I, Schröder's for part II. The course is open to advanced undergraduates, but is suitable for graduates also. Graduates taking the course will, upon request, be organized into a class to meet separately once a week for the study of special problems in Faust-criticism.—*Two (three) hours a week, throughout the year.*

Teachers' Course.

Intended specially for those, whether graduates or advanced undergraduates, who are preparing to teach German in the secondary schools. Several kinds of work are carried on more or less simultaneously: (1) Study of modern German Grammar from a historical point of view (Brandt's Grammar, with amplificatory lectures); (2) Critical study of selected masterpieces, with discussion of assigned topics in a number of short German essays; (3) Lectures and discussions upon methods of teaching, text-books, etc.; (4) Recitations from Kluge's *Geschichte der deutschen Nationallitteratur*, beginning with the section on Klopstock.—*Three hours a week, throughout the year.*

History of German Literature.

Lectures accompanying systematic readings from Müller's German Classics. The period covered extends from the earliest times to the middle of the nineteenth century. The course is an advanced elective for undergraduates, but is suited to the needs of graduates that have never taken a general survey of German literature in its historical development.—*Three hours a week, throughout the year.*

Goethe Seminary.

Goethe's storm and stress writings, with special reference to English influence.—*Open to graduates only. Once a week, first semester.*

Professor THOMAS and Assistant Professor HENCH:—

Graduate Club.

All graduate students pursuing German either as a major or as a minor study meet once a week in a club, the purpose of which is to afford training in the work of linguistic and literary research. The members will present short papers, connected with their special studies—reviews, bibliographies, reports of preliminary investigations, etc. Instruction will be given both in informal criticisms and in formal lectures.

Assistant Professor HENCH:—

Middle High German.

Introduction to language and literature. Lectures and recitations. Text-books: Paul's *Mittelhochdeutsche Grammatik*, 3d ed., and Weinhold's *Mittelhochdeutsches Lesebuch*, 4th ed. An advanced elective for undergraduates, but suitable for graduates who have not yet begun the study of Middle High German.—*Two hours a week, first semester.*

The Nibelungenlied.

Reading, with lectures on language, mythological elements, and composition of the epic. Continuation of the last named course.—*Two hours a week, second semester.*

Old High German. Introductory course. Text-books: Braune's *Althochdeutsche Grammatik*, 2d ed., and Braune's *Althochdeutsches Lesebuch*, 3rd ed. Primarily for graduates.—*Two hours a week, second semester.*

Old High German. Advanced course in continuation of last named. Critical study of the language and syntax of the monuments of the ninth century.—*Two hours a week, first semester.*

GOTHIC.

Assistant Professor HENCH:—

Introductory Course.

Wright's *Primer*. Primarily for graduates.—*Two hours a week, first semester.*

Advanced course in continuation of last named. Epistles and Skeireins, as contained in Heyne's *Ulfilas*, 8th ed. Lectures on Historical Grammar based on Kluge's *Vorgeschichte der altgermanischen Dialekte*.—*Two hours a week, second semester.*

ENGLISH AND RHETORIC.

The advanced work of this department proceeds along three main lines:

1. *History and Philology of the English Language.* Opportunity is offered for (1) a detailed study of the phonology, morphology, and syntax of Old English;* (2) a survey of the historical development of the language, and (3) a special study of the spoken English of to-day. An elementary knowledge of Anglo-Saxon is necessary in order to enter upon this work.

*The term "Old English" is used in this Announcement for the period of English afterwards called "Anglo-Saxon."

2. *Higher Rhetoric.* A historical course in the classics of criticism and literary theory. Advanced courses in elocution and oratory are also provided, involving the critical study of great orators, ancient and modern, and the application of the principles of formal logic by means of oral and written discussions; these courses must be preceded by a year's work in elocution.

3. *Literature.* In the seminary courses in English and American literature opportunity is offered, through reading and discussion, for original research bearing upon (1) the nature and meaning of the great movements in the history of literature; (2) the influence exercised upon English and American writers by the literature of other nations; and (3) the interpretation of works of literary art in the light of established critical principles.

The following courses (open also to undergraduates who are prepared to take them) will ordinarily be found adapted to the needs of graduate students. In case of persons who have taken these courses for their first degree, special advanced courses for graduate study are provided after conference with the candidate. *Candidates for the doctorate are generally found in this category.*

Graduate students prepared to do advanced work in Old-English are offered in the first semester the courses in Old-English syntax, and in the second, that in Old-English phonology and morphology. At the same time with the syntax, the general subject of historical English grammar may be taken up, and this be followed in the second semester by the study of the modern spoken language; but students who desire to make a study of early English literature will take instead the work in Old-English poetry, to be accompanied, at their choice, by the undergraduate course in Transitional and Early Middle English.

Graduate students not yet prepared to do advanced work in Old English will omit or defer the course in Old-English syntax, and will begin the subject with the undergraduates, preparing themselves for the two Old-English courses offered in the second semester.

Professor DEMMON:—

English Literature Seminary.

Each student is expected, first, to present two papers during the semester, one an essay upon an assigned masterpiece, the other a critique of a fellow-student's essay; second, to participate each week in a general *ex tempore* discussion of the work under consideration; third, to read the entire list of works with which the course deals, together with such critical literature on each subject as there may be time for. The list of masterpieces is as follows: More's *Utopia*; Bacon's *Essays*; Milton's *Areopagitica*; Burke's *Reflections on the*

French Revolution; Carlyle's *Sartor Resartus*; George Eliot's *Silas Marner*; Spenser's *Faery Queen*, Book I; Shakespeare's *Sonnets*; Milton's *Paradise Lost*; Dryden's *Absalom and Achitophel*; Pope's *Essay on Man*; Wordsworth's *Excursion*; Tennyson's *Princess*.—*First semester.*

Shakespeare Seminary.

The method is similar to that in the preceding course. The plays selected are: *A Midsummer Night's Dream*; *The Merchant of Venice*; *As You Like It*; *Twelfth Night*; *The Tempest*; *Richard II*; the two parts of *Henry IV*; *Henry V*; *Richard III*; *Hamlet*; *Macbeth*; *Othello*; *King Lear*; *Coriolanus*.—*Second semester.*

History of the English Drama.

Lectures. To accompany the work of the Shakespeare Seminary.

American Literature Seminary.

Authors studied: Irving, Poe, Hawthorne, Bryant, Longfellow, Emerson, Thoreau, Bayard Taylor, Whittier, Holmes, Lowell, Howells and James. Representative works of the authors named are studied, and an attempt is made to discover the distinctively American element by a comparative study with British authors.—*Second semester.* When this study is taken for an advanced degree, individual work is assigned for the first semester, upon which the candidate is expected to make weekly reports.

Higher Rhetoric and Literary Criticism.

Reading and discussion of the whole or parts of standard works in rhetoric and literary criticism. Candidates who take their major in English Literature are expected to take this course in connection with the seminary work in English Literature and Shakespeare.—*Weekly throughout the year.*

Assistant Professor HEMPL:—

Old-English Syntax.

The investigation of specific problems; together with a brief general survey of the subject.—*Two hours a week, first semester.*

Old-English Phonology and Morphology.

A study of early West-Saxon prose, with special reference to sounds and inflection.—*Two hours a week, second semester.*

Historical English Grammar.

A general survey of the subject, and the investigation of the origin and development of impugned Modern-English idioms.—*Two hours a week, first semester.*

Spoken English.

A study of colloquial English as distinguished from the English of books and of formal speech, and the investigation of the more important facts as to the fortunes of English speech in this country.—*Two hours a week, second semester.*

Old-English Poetry.

A study of early English literature, with special reference to the poetical monuments.—*Two hours a week, second semester.*

Professor TRUEBLOOD:—

Study of Great Orators, ancient and modern.

Lectures on methods of public address and sources of power. Study of representative selections. The method is similar to that in the English Literature seminary.—*Throughout the year.*

Oral Discussions.

This course is designed to develop readiness of extemporization. It involves the application of the principles of formal logic and elocution in the discussion of leading topics of the day. Students are required to present briefs of the subjects discussed.—*Second semester.*

HISTORY.

The University Calendar for 1892-93, pages 63 to 66, shows the general arrangement of the historical courses given in the Department of Literature, Science, and the Arts. Courses 1, 3, 4, 6, 7, and 8, there described, represent the fundamental work in history with which the graduate student, who has history for a major study, is expected to be acquainted, or which he will be expected to take before entering upon the strictly graduate work described below, though it is not necessary that all these courses be taken before entering the graduate school to study history. A great portion of the work of a graduate student will be individual research and investigation under the personal supervision of the professor in charge, though the list of courses named below does not include that class of work.

Professor HUDSON:—

European History and Comparative Constitutional Law.

The advanced work in Modern European History includes,—

(a) A study of the French Revolution and of the Empire of Napoleon.

(b) The general history of Europe since 1815. This course will take up specially a study of the unification of Germany and of Italy, and of the tendencies which have brought about present constitutional conditions.

The work in Comparative Constitutional Law is largely of a

seminary character. There are lectures on the institutions of modern European states; but the more advanced work is conducted on the seminary plan and covers a comparative study of constitutional systems. In addition to a seminary in comparative constitutional law, there will be a course for the study of the policy and relations of the leading European states in the light of historical conditions. Each of these seminars requires *two hours a week, throughout the year*.

Professor McLAUGHLIN* :—

American History and Constitutional Law.

Many graduate students find courses 3 and 4, as announced in the Calendar for 1892-93, suited to their needs. These courses, however, will not be sufficient for those who expect to take an advanced degree with American History for a major study.

The more advanced work includes,—

(a) A seminary in later American history designed to give instruction in methods of research and investigation of primary authorities.

(b) A course of topical study giving opportunity for a somewhat careful study of certain periods from the best secondary authorities. One aim of the course is to widen the student's knowledge of the bibliography of the subject.

(c) Constitutional Law. Graduate students selecting this line of work will be expected to study leading cases in the reports, and to read the best works on American political institutions. The aim is to give a knowledge of the constitution as it has been interpreted by the courts and is daily interpreted in action by the political departments.

PHILOSOPHY.

The advanced courses described below presuppose instruction in logic, ethics, and general psychology; also a general introduction to philosophy and a somewhat extended study of the history of philosophy, ancient, mediæval, and modern. Candidates for a higher degree who have not had a preparation equivalent to this will be expected to take certain of the lower courses, either before entering upon, or in connection with, their graduate work. Advanced courses bearing upon the history of philosophy are also given in the departments of Greek, Latin, French, and German.

A. HISTORY OF PHILOSOPHY.

Mr. MEAD :—

The History of Philosophy.

A general outline of the subject from Thales to the present century.

* Professor McLaughlin has leave of absence for the year 1893-94, but the courses announced for him will be given under competent instructors, and special research will be properly directed.

The course is designed to state the development of philosophical problems and concepts, and thus to give the student his bearings in philosophy. It is therefore highly advisable, if this course has not been taken before beginning graduate work, that it be taken at once upon beginning it.—*Three hours a week, throughout the year.*

Supplementary work in the History of Philosophy.

The object of this course is to introduce the student to the methods of investigation and discussion in the subject. Some special points of the general course are taken up and given more detailed consideration.—*One hour a week, throughout the year.*

Professor DEWEY:—

Movement of Thought in the Nineteenth Century.

Lectures upon the development of thought in the present century, beginning with Rousseau. The course is intended to correlate the philosophical movement of the century with political and literary developments; it is non-technical, and should, whenever possible, be taken as undergraduate work.—*Two hours a week, first semester.*

Mr. LLOYD:—

Contemporary Philosophy.

This course takes the subject up at a somewhat later date than the preceding course, and it is more technical in method. In 1893-94 it will deal particularly with the philosophic thought of Lotze and Edward Caird. It will be omitted in alternate years, and in its stead a course in Kant's Critique will be given.—*Three hours a week, first semester.*

The Philosophy of Spinoza.

Elwee's translation. Lectures, and study of the ethics.—*Two hours a week, second semester.*

Special Study in Spinoza.

For the more detailed study of special points than the preceding course affords. These two courses will probably alternate with courses in Hegel's Logic (Wallace's translation).—*One hour a week, second semester.*

B. PSYCHOLOGY.

Mr. MEAD:—

Special topics in Psychology.

A summary of some of the chief points of psychology (sense-perception, attention, instinct, psycho-physical law, hypnotism, etc.), from the standpoint of modern experimental methods. Lectures, demonstrations, and experiments. The larger works of Ladd and James will afford collateral reading.—*Three hours a week, first semester.*

English Psychology.

A historical sketch of its development from Locke, through Hume, Hartley, and the Mills, to Bain.—*Three hours a week, second semester.*

Original Investigation in the Laboratory.

The work will be along three lines, physiological psychology, psycho-physics, and a study of the psychical phenomena of the lower forms of life.—*Four hours a week, throughout the year.*

C. ETHICS.

Professor DEWEY:—

Political Philosophy.

A critical discussion of the development of the idea of the social organism, social statics, or the conditions of social order, involving a discussion of sovereignty, rights, and duties; and social dynamics, or the methods and principles of social progress.—*Three hours a week, first semester.*

Supplementary Course in Political Philosophy.

A more detailed investigation of one or two topics discussed generally in the preceding course. In 1893-94 it will probably deal with the political thought of T. H. Green.

Anthropological Ethics.

The origin and early development of moral ideas and customs; an attempt to discover the psychological and social conditions in which primitive morality has its basis.—*Two hours a week, second semester.*

Seminary.

Historical investigation and critical discussion of typical problems. In 1893-94 one or all of the following subjects will be taken up: the psychology of action in its ethical bearings as treated in English Ethics; the psychology of will in its relations to the theory of sovereignty; the conflict between theories basing morality upon natural law and those basing it upon institutional life.—*Three hours a week, throughout the year.*

Mr. LLOYD:—

History of British Ethics from Hobbes to Mill.

A study of the development of ethical ideas and problems in Great Britain. Special attention is given to the reflection of English political and industrial life in its ethical theory.—*Two hours a week, first semester.*

D. ÆSTHETICS AND PHILOSOPHY OF RELIGION.

Professor DEWEY:—

Æsthetics.

Historical development of its problems; its psychological basis.—

Two hours a week, first semester.

Mr. LLOYD:—

Philosophy of Religion.

Lectures and assigned readings.—*Two hours a week, second semester.*

THE SCIENCE AND THE ART OF TEACHING.

Three courses constitute the foundation of the work in this department. Course one, four hours a week, for one semester, is a practical course, dealing with methods of instruction, general school-room practice, school hygiene, and school law. Course two, also four hours a week, for one semester, theoretical and critical, deals with the principles underlying teaching and government, as deduced from the facts of human nature, physical, mental, and moral, and the educational values or uses of studies. Course three, three hours a week, for one semester, devoted to school supervision, deals especially with the duties of superintendents and principals, including the arts of constructing courses of study and grading schools, and conducting examinations, teachers' meetings, institutes, etc. These courses are open to students seeking advanced degrees, and are sometimes pursued by them with interest and advantage. Such students are strongly advised to take course two, at least, if they have never studied the science of teaching, provided they intend to follow the art of teaching. As the three courses are strictly professional, lying wholly outside of the field of general study, there is manifest reason in recommending them to graduate students, although elementary.

Graduate students who have had this more elementary instruction, should choose their work among the more advanced courses of the department, given below. These courses are supplemented by private reading done under the direction of the professor, as far as necessary. These more advanced courses may also be profitably pursued by students who have not done the elementary work, although some previous practical or theoretical acquaintance with that work is desirable. Students who do not intend to become practical teachers, but who elect work in this department for its culture value, are, as a rule, advised to make choice of educational history, or of that subject combined with the science of teaching. It may be added that, while the primary aim of the department is to assist students seeking to fit themselves for the work of teaching, the general culture value of the several courses is kept constantly in

mind. Nothing need be said about the doctor's degree specially, except that private study will be assigned to the candidate according to the nature of the work.

Professor HINSDALE:—

History of Education: ancient and mediæval.

Recitations and lectures. Text-book: Compayré's History of Pedagogy.¹ The subjects treated in the lectures given in this course are oriental, Greek, and Roman education, and the rise and early development of Christian schools.—*Three hours a week, first semester*

History of Education: modern.

Recitations and lectures. Text-book: Compayré's History of Pedagogy. The topics dealt with in this course of lectures are the movements of modern educational thought and practice.—*Three hours a week, second semester.*

The Comparative Study of Contemporary Educational Systems: domestic and foreign.

Besides a general survey of the institutional organization of education in the United States, similar surveys are made of several foreign countries, as Germany, Italy, France, and England. Lectures.—*Two hours a week, second semester.*

Seminary.

Study and discussion of special topics in the history and philosophy of education.—*Two hours a week, second semester.*

POLITICAL ECONOMY.

Undergraduate courses in political economy which are not here enumerated represent the work of at least one academic year. These courses cover the elements of political economy, the history of industrial society, and an introductory study of the more important special problems of economics.

Of the courses enumerated below, those designated as "Intermediate Courses" are open to undergraduate as well as to graduate students, but special instruction of one hour a week will be afforded all graduate students in connection with each course, this extra hour being devoted to a more careful analysis and a more extended discussion than is possible in the lectures. The courses designated as "Graduate Courses" are open only to graduate students, or to undergraduates making a specialty of political economy.

Professor ADAMS:—

Principles of the Science of Finance.

Under the science of finance will be included a discussion of princi-

ples of public expenditure, budgetary legislation, financial administration, public industries, and public debts. Mr. Dixon will assist Professor Adams in this course.—*Intermediate course, two hours a week, second semester.*

Transportation Problem.

This course traces the history of transportation as an industry, shows the social, industrial, and political results of modern methods of transportation, presents an analysis of the railway problem, and discusses the various solutions proposed.—*Intermediate course, two hours a week, second semester.*

Critical Analysis of Economic Thought.

In this course, as in the one following, it is the design to acquaint the student with the latest phase of economic development. Acquaintance with the principles of political economy by John Stuart Mill is assumed, and the discussions respecting economic theory since 1850 are subjected to critical analysis.—*Graduate course, one hour a week, first semester.*

Critical Examination of the Labor Problem and the Monopoly Problem.

In this course acquaintance with the theories of socialism and with the lines of discussion on all practical economic problems is assumed, and the question as to the probable outcome of labor agitations, or of political agitations traced to the existence of industrial monopolies, and of the effect of these agitations on the further development of economic theory, is subjected to discussion.—*Graduate course, one hour a week, second semester.*

Seminary in Finance; and Seminary in Economics.

It is the purpose of these courses, which may be regarded as a single course, to give students an opportunity of acquainting themselves with proper methods of investigation. The subject of these seminars will be varied from year to year according to the needs of the students; and it may be proper to add, that the "extra hours" given in connection with "History and Theory of Money and Banking" and with "History of Political Economy," are conducted according to seminary methods.—*Graduate course, twice a week, throughout the year.*

Assistant Professor TAYLOR:—

Land Problems Historically and Theoretically Considered.

In this course will be treated the evolution of landed property, agrarian movements in all ages, land nationalization, the history of tenures, land-transfer, peasant proprietorship, and the farmer

question in the United States.—*Intermediate course, two hours a week, first semester.*

Socialism.

This course is in a measure complementary to the preceding. As that course is devoted largely to the consideration of the various plans for redistributing the unearned surplus of land values, so this course treats of schemes for distributing the other industrial surpluses, interest, and profits. It will include the study of communism, socialism proper, state socialism, and socialistic legislation generally.—*Intermediate course, two hours a week, second semester.*

History and Theory of Money and Banking.

In this course, while stress will be laid on the *theory* of money, special effort will be made to secure a thorough understanding of *current monetary problems* in the United States. An extra hour for conference and reports on reading will be given to graduate students desiring it.—*Intermediate course, two hours a week, first semester.*

Industrial History of the United States.

This course is intended to bring out the facts of the growth of agriculture, manufacture, and commerce in the United States, and seek an explanation of the causes at work. It will include a history of corporations and trusts, as also a history of strikes and labor movements generally.—*Intermediate course, two hours a week, first semester.*

Social Philosophy with special reference to Economic Problems.

The purpose of this course is to consider the chief concepts and principles which lie at the foundation of economic society. It will consider the various doctrines as to the essential nature of society (mechanism, organism, etc.), the different social ideas (utilitarianism, laissez-faire, etc.), the nature and limits of the property right, the ideal principle of distribution, the family as a factor in economic society, etc.—*Graduate course, one hour a week, second semester.*

Mr. C. H. COOLEY:—

Theory of Statistics.

The earlier part of this course consists of lectures. Later, practical exercises are introduced, and during the second semester the student is expected to undertake work having in some measure the character of independent research.—*Intermediate course, one hour a week, throughout the year.*

History of Political Economy.

Intermediate course, two hours a week, second semester.

Mr. DIXON:—

History of the Tariff in the United States.

Intermediate course, two hours a week, second semester.

The Economic FACULTY:—

Current Economic Legislation and Literature.

It is the custom of all graduate students of economics to come together one evening each week for the purpose of reporting upon current economic legislation and literature, and freely discussing all topics pertaining to economy which may be of general interest.

INTERNATIONAL LAW.

The courses in international law presuppose a general acquaintance with modern European history.

President ANGELL:—

Lectures on International Law.

Two hours a week, first semester.

History of Treaties.

Two hours a week, second semester.

MUSIC.

The lower courses given in the University, but not here enumerated, provide instruction in the science and practice of choral music, the science of harmony, simple and double counterpoint, and canon and fugue.

Professor STANLEY:—

History of Music: to modern opera.

Lectures.—*Two hours a week, first semester.*

History of Music: modern music; masterpieces.

Lectures.—*Two hours a week, second semester.*

Free Composition and Instrumentation.

Two hours a week, throughout the year.

Musical Analysis.

Lectures and text-book.—*One hour a week, first semester.*

Musical Criticism.

Lectures.—*One hour a week, second semester.*

MATHEMATICS.

The courses mentioned below presuppose the usual preparatory course in algebra and elementary geometry, plane, solid, and spherical, together with two years of collegiate study devoted to trigonometry, higher algebra, plane analytic geometry, and differential and integral calculus.

A. PRIMARILY FOR GRADUATES.

Professor BEMAN:—

Solid Analytic Geometry.

Chas. Smith and Frost, with references to Salmon.—*Two hours a week, second semester.*

Differential Equations.

Forsyth, with references to Johnson, Boole, and Mansion.—*Three hours a week, first semester; two hours a week, second semester.*

Mathematical Reading.

This course is designed to give graduate students an opportunity to read standard mathematical works under the direction of the faculty. Jordan's Cours d'Analyse will be read in 1893-94.—*Three hours a week, throughout the year.*

Assistant Professor COLE:—

Theory of Complex Numbers.

This course leads to the theory of the elliptic and other transcendental functions. Its subject matter is the logical development of the conception of the complex (imaginary) quantities, and the consideration of the properties of functions of a complex variable.—*Three hours a week, first semester; two hours a week, second semester.*

Assistant Professor ZIWET:—

Advanced Mechanics.

This course is designed for students who have taken a preliminary course in mechanics involving the elementary applications of the calculus. The first part of the course is mainly devoted to the theory of the potential and its applications; the second to rigid dynamics.—*Two hours a week, first semester; three hours a week, second semester.*

B. FOR GRADUATES AND UNDERGRADUATES.

Professor BEMAN:—

Solid Analytic Geometry.

Chas. Smith and Frost, with reference to Salmon.—*Two hours a week, first semester.*

Quaternions.

Hardy, with references to Tait and Hamilton.—*Three hours a week, second semester.*

Teachers' Seminary.

Critical study of certain text-books in algebra and geometry, together with the discussion of methods and aims in mathematical

teaching, sketches of the history of mathematics, lists of books for teachers, etc.—*Two hours a week, throughout the year.*

Assistant Professor COLE:—

Modern Geometry.

This course is devoted to a systematic treatment of the elements of modern coördinate geometry as a basis for the theory of higher curves and of surfaces on the one hand, and of invariants on the other.—*Three hours a week, throughout the year.*

Dr. MARKLEY:—

Modern Higher Algebra.

This course is based upon Burnside and Panton's Theory of Equations.—*Three hours a week, second semester.*

PHYSICS AND ELECTRICAL ENGINEERING.

The courses here announced presuppose about one and a half years' collegiate work in physics; viz., a course in mechanics, sound, light, electricity, magnetism, and heat, five hours a week, for one year; a beginners' course in laboratory work, two or three hours a week for half a year; and a course in primary and secondary batteries, two hours a week for half a year.

The courses in Electricity and Magnetism (Mascart and Joubert), the Theory of Light (Preston), and the Dynamic Theory of Heat are primarily for graduates; the other courses are open to undergraduates, but they are found to be beyond the work done in many colleges.

Graduate students, who are properly qualified by their previous training, have opportunity for original research in the physical laboratory under the immediate supervision of the director and his associates.

Professor CARHART:—

Dynamo Electric Machinery.

Three hours a week, second semester.

The Alternate Current Transformer; Fleming.

Two hours a week, first semester.

The Dynamic Theory of Heat.

Two hours a week, first semester.

Professor CARHART, Assistant Professor PATTERSON, and Mr. ROWE:—

Electrical Units and Measurements.

Lectures, *two hours a week*, laboratory work, *three times a week, first semester.*

Professor CARHART and Mr. REED:—

Theory of Light; Preston.

Lectures and recitations, *two hours a week*, laboratory work, *twice a week*, second semester.

Assistant Professor PATTERSON:—

Mathematical Electricity; Emtage.

Three hours a week, first semester (second semester in 1894-95).

Electricity and Magnetism; Mascart and Joubert.

Two hours a week, second semester (first semester in 1894-95).

Advanced Work in Photometry.

One (or two) hours a week, second semester.

Mr. ROWE:—

Advanced Laboratory Work in Electricity and Magnetism.

Twice a week, second semester.

GENERAL CHEMISTRY.

The courses here announced presuppose about two years' collegiate study of general, analytical, and organic chemistry, comprising both theoretical instruction and laboratory practice. The laboratory research courses are intended primarily for graduate students. The lecture courses are for graduates and advanced undergraduates, but graduates taking these courses will receive additional special instruction of one hour a week. Students taking general chemistry as a major study are required to have a reading knowledge of German and French.

Professor FREER:—

Theoretical Chemistry of Recent Years.

Lectures, readings, and laboratory work in the methods of determining molecular weights. Lectures, *two hours a week*, laboratory work, *one hour a week*, first semester.

German Chemical Literature; Journal Club.

The Journal Club will be under the direction of Professor FREER, but all the instructors in the department of general chemistry will take part therein—*Two hours a week*, second semester.

Laboratory Research.

The work may be in organic or in inorganic general chemistry. Students taking organic work must have a good knowledge of organic preparations.—*Hours arranged with instructor*, throughout the year.

Mr. Higley:—

The Rarer Chemical Elements.

Lectures and laboratory work in inorganic preparations. Lectures,

two hours a week, laboratory work, one hour a week, second semester.

Laboratory Research in Selected Topics in Inorganic General Chemistry.

Hours arranged with instructor, throughout the year.

Mr. LICHTY:—

Laboratory Work.

Methods of determining molecular weights and other problems involving the specific gravity of gases.—*Three hours a week, second semester.*

Laboratory Research.

Involving the methods employed in the preceding course.—*Hours arranged with instructor, second semester.*

ORGANIC CHEMISTRY AND ANALYTICAL CHEMISTRY.

The necessary preparation for the several graduate courses in these subjects is stated separately for each course below. For full graduate studies in analytical or organic chemistry each application is judged upon its individual merits, in view of the nature of the studies desired and the collateral qualifications of the applicant. In every case the student must have made himself competent for trustworthy determinations in the laboratory, and should have begun to use chemical literature in its original sources. The undergraduate work in these subjects in this University embraces fifteen courses, omitted from this announcement, amounting to sixty-one hours of credit, in addition to the courses in general chemistry and in physiological chemistry.* From twenty-one to forty-two hours of credit in chemistry, general, analytical, and organic, if the work be well directed to the end in view, may be made to suffice, according to the aims of the student, to prepare him for graduate studies in organic and analytical chemistry. Graduates of other colleges who have carried chemical studies with laboratory work through two years are in many cases found prepared to take up graduate courses here at once. Candidates for a higher degree who take chemistry as a major study are expected to engage in original studies, both in the laboratory and in the library. Any student can do creditable work in a research, under direction, if he have sufficient preparation and exercise faithful industry. In the research courses it is usually made a part of the student's work to prepare his report in literary form adapted for publication in a chemical periodical. In laboratory work, hours can be arranged between 8 A. M. and 6 P. M.

* Details in regard to the undergraduate courses are given in the University Calendar for 1892-93, pages 78 to 81. An "hour of credit" implies the satisfactory completion of work equivalent to one exercise a week during one semester.

Professor PRESCOTT:—

Organic Synthesis and Ultimate Analysis.

Open to those who are prepared in general chemistry, primary organic chemistry, qualitative and quantitative analysis, and the initial organic preparations. Laboratory work, with reading by subjects in the library. The laboratory work may be taken mainly in synthetic preparations or mainly in organic combustions. If mainly in the combustion work, it may well be accompanied by molecular weight determinations in the laboratory of general chemistry. If mainly in synthesis, it is accompanied by the indexing of chemical literature in the library, following well defined lines of synthetic production, with reports, in a seminary class, upon both literature and experimentation. The synthetic studies especially lead to original research, and are continued as such in another year's course.—*Hours arranged with instructor, throughout the year.*

Analytical Organic Chemistry.

Open to those who are prepared in general chemistry, qualitative and quantitative analysis, primary organic chemistry, and proximate organic analysis equivalent to undergraduate course 14. Laboratory work with research in the library. Qualitative and quantitative work with the alkaloids, the fats, the recovery of poisons, and methods of chemical estimation of the purity of waters. In the determination of organic compounds chemical methods are mostly employed, but these are conjoined with optical methods by use of the polariscope, spectroscope, and refractometer, as well as by microscopic examinations. The student elects some one branch of the work provided for in this course, as, for instance, the alkaloids, and devotes himself to experimentation in this branch and to its bibliography, reporting his progress from time to time in the seminary. Before the close of the course the work becomes original investigation.—*Hours arranged with instructor, throughout the year.*

Investigations in Organic Chemistry.

The general chemical preparation for research is that required for one of the two courses above named. Besides this, some special preparation, such as can be obtained in one of the above named courses, is usually necessary. Critical bibliography is classed as research, but it must be accompanied by laboratory investigation unless the student has experience in the latter. Any subject in organic chemistry, synthetic or analytic in its aim, and within the range of inquiry in this laboratory, may be agreed upon. The constitution of the compounds of the alkaloids is under investigation at present. The student is expected to gather from chemical literature the substance of a full

history of his subject, usually preparing some form of bibliography. In the seminary class the student reports his results and his plans, from time to time, when there is a critical discussion of his report.—*Hours arranged with instructor, throughout the year.*

Professor JOHNSON:—

Qualitative Analytical Chemistry.

Open to those well prepared in qualitative analysis, and in a beginning course in quantitative analysis, in addition to a course in general chemistry. The applicant must be able to pass examination in courses 1 and 4 of the undergraduate studies, or their equivalent. The work consists in an advanced study of qualitative methods and reactions, with a search of the original literature. Lectures, *two hours a week*, laboratory work, *hours arranged with instructor, second semester.*

Investigations in Inorganic Reactions and Qualitative Methods.

Open to those who have completed the course last named, or, being prepared to enter that course, have also such special preparation as the desired research demands. The subject of a student's research may be selected in any range of inorganic reactions, such as studies of oxidation and reduction, comparative methods of separation, limits of qualitative recovery, and the composition of products in analysis. The facts of oxidation, in its successive degrees, are especially under experimental inquiry.—*Hours arranged with instructor, either first or second semester, or, preferably, both semesters.*

Assistant Professor CAMPBELL:—

Quantitative Analytical Chemistry.

Open to those well prepared in qualitative analysis, who have had the beginning course in quantitative work, equivalent to course 4 of undergraduate studies, in addition to a study of general chemistry. Laboratory work and library reading. The work consists of general advanced quantitative analysis, with specialization in the direction of the aims of the student.—*Hours arranged with instructor, first or second semester, or both semesters.*

Investigations in Metallurgical Chemistry and Quantitative Methodss.

Open to those who have completed the course last named, or have had an equal amount of training which should be applicable to the research desired. The undergraduate courses 6 and 7 are advantageous in preparation for this research. The subject of the research

may be taken from any part of quantitative work, to fill out deficiencies in analytical science. It is the special desire in this laboratory to make advances in the proximate analysis of iron and steel, and other metals, that is, to determine the actual chemical union of the elements existing in metals as manufactured. Gas analysis is employed where the research requires it. Critical bibliography is carried along with laboratory determinations, as means of research.—*Hours arranged with instructor, throughout the year.*

HYGIENE AND PHYSIOLOGICAL CHEMISTRY.

The courses here announced presuppose that the student taking them is prepared for original research.

Professor VAUGHAN:—

Original Research on the Causation of Disease.

Hours arranged with instructor, either first or second semester.

Assistant Professor NOVY:—

Advanced Physiological Chemistry.

Laboratory work and reading.—*Hours arranged with instructor, either first or second semester.*

ASTRONOMY.

The courses here announced presuppose acquaintance with general, spherical, and practical astronomy and observatory practice.

Professor HALL:—

Theoretical Astronomy.

Computation of orbits, correction of approximate elements, and theory of special perturbations.—*Five hours a week, throughout the year.*

Mathematical Theory of Planetary Motion.

Elementary treatment of general perturbations.—*Three hours a week, first semester.*

Professor HALL and Mr. ———:—

Extended Practical Course in the Use of Instruments.

Hours (at the observatory) arranged with instructors, first semester.

Mr. ——— :—

Method of Least Squares and Empirical Curves.

Two hours a week, first semester.

Spherical Astronomy.

Three hours a week, throughout the year.

MINERALOGY.

The higher work in mineralogy presupposes an elementary knowledge of chemistry and an introductory course in mineralogy, combining theoretical instruction with practice in determining minerals. This work will be directed by Professor PETTEE.

GEOLOGY.

The course of instruction in geology for undergraduates, as announced in the University Calendar for 1892-93, page 83, embraces two years. The first year is devoted to elementary studies in physical geology and historical geology, giving three hours a week to each for one semester. Le Conte's Elements of Geology is used, supplemented by lectures and exhibitions of specimens, maps, etc. During the second year more detailed instruction is given, two hours each week, in the same general subjects. Green's Physical Geology is used for reference during the first semester, supplemented by lectures and laboratory work. Each student is given a special subject for investigation in connection with which a thesis of about 2500 words is required. During the second semester palæontological studies are carried on with the aid of various treatises and laboratory work. A special subject is assigned each student and a short thesis is required.

Students in the graduate school may enter either of the advanced courses mentioned above, providing studies equivalent to the elementary course have been pursued. Those who have done more work than is represented by the elementary course may make special arrangements for instruction and assistance in various lines of study dependent on their tastes and acquirements. In a general course the current literature of geology will be read with special reference to Pleistocene geology and to the origin and classification of topographic forms, glacial records, lake histories, erosion, and all of the processes by which the surface of the earth has come to have its present form.

The geological museum is being rearranged and a series of fossils selected to illustrate the life history of North America. This collection is intended especially for the use of students in the elementary courses, but may be consulted by advanced students as well. The specimens will be exhibited in the lecture room as required, and after lectures will be returned to the cases in the museum where they will be available for examination at any time.

There is a second collection embracing some ten thousand specimens of both American and European fossils, which is arranged zoologically and intended for the use of advanced students in palæontology. Special collections of rocks, brachiopods, corals, etc., numbering from one hundred and fifty to two hundred specimens each are arranged in the geological laboratory for the immediate use of students.

The collection in physical geology is small, but efforts are being made for its enlargement, and it is expected that by the opening of the collegiate year in October, 1893, ample material will be on hand to illustrate lectures in this department. Students bringing private collections will be given an opportunity to arrange them in cases provided for the purpose, and facilities for consulting original monographs, and making comparison with specimens in the museum.

The geological laboratory is provided with apparatus for preparing thin sections of fossils and rocks, and with microscopes and photographic instruments. The laboratory is open to students from nine until five each day throughout the collegiate year.

The work in geology will be conducted by, or under the direction of Professor RUSSELL.

SYSTEMATIC ZOÖLOGY.

The courses here announced presuppose about one year's collegiate study of systematic zoölogy, both vertebrate and invertebrate, and a course combining lectures and laboratory practice in the identification of vertebrates.

Professor STEERE:—

Systematic Study of Vertebrates.

Hours arranged with instructor, either first or second semester.

Special Study of Invertebrate Groups.

Hours arranged with instructor, first semester.

Development of Species and Theory of Classification.

Two hours a week, first semester.

ANIMAL MORPHOLOGY.

The courses here announced presuppose a year's work in general biology, such as is carried on in this University conjointly by the departments of botany and animal morphology. Following the general biology, work is provided in both invertebrate and vertebrate morphology. Candidates for the higher degrees will usually pursue both lines of work, but will find it of advantage to specialize in one of them; they will also be required to have a knowledge of the elements of physics and chemistry and some acquaintance with French and German.

In the laboratory, a description of which is given in the University Calendar, the student learns methods of dissection, staining, imbedding, section-cutting, graphic and solid reconstruction, and other technical methods of investigation. A library, shelved in the laboratory, contains sets of the important English and foreign periodicals, as well as many monographs, and other separate publications. It contains, also, an extensive collection of original papers relating to the vertebrate fauna of the fresh waters. The private collections of the instructors in mor-

phology and the library of the Department of Medicine and Surgery, which is rich in the literature of vertebrates, are also accessible to students. The original papers in connection with both lectures and laboratory work are placed in the hands of students, and special reading is required.

Graduate students will often find the elementary work in general biology of value to them, and they can rarely omit, without loss, any of the courses in animal morphology that are open to undergraduates, if they have not already taken them or their equivalent.

A student who selects animal morphology as a *minor* for the *master's degree* may pursue the course in invertebrate morphology, vertebrate comparative anatomy, vertebrate embryology, or histology, but should not attempt to do work in more than one of these subjects. If animal morphology be chosen as a *major*, work may be taken in invertebrate morphology and at the same time in any two of the branches of vertebrate morphology named above. For any one of these branches the student may substitute the preparation of a thesis, and such substitution is advised for those who do not intend to become candidates for the doctor's degree.

The work outlined for those who elect animal morphology as a major for the master's degree, is suitable for candidates for the *doctor's degree* who elect this subject as a *minor*.

Those electing animal morphology as a *major* for the *doctor's degree* are expected to complete all the courses offered. During the first part of his term of residence at the University, the candidate should devote his time to these courses and to the completion of work on the minors. In his second year of residence, in addition to completing the work mentioned, he is expected to repeat a designated piece of research work in order to acquaint himself with methods of investigation. At the same time he does assigned reading on the more important problems of morphology and on zoölogical history and theory. At least one year must be devoted to the research which is to be embodied in the doctor's dissertation.

To *graduates* who have taken as undergraduates any of the courses specified above or their equivalent, is assigned a corresponding amount of work in reading and in the preparation of a thesis.

Those electing animal morphology as a major, will find it of advantage to select as one minor either botany, physiology, systematic zoölogy, palæontology, or physiological psychology. Less closely related is work in bacteriology, physiological and organic chemistry, and geology.

A. PRIMARILY FOR GRADUATES.

Professor REIGHARD:—

Field Club Work.

This course consists of a study of the invertebrate fauna of the

neighboring waters and illustrates the application of morphological principles to classification. Excursions are made and the forms collected are determined by the use of the original literature. In 1893-94 special attention will be given to crustacea and parasites. The work on parasites will be under the direction of Dr. WARD.—*Two hours a week, throughout the year.*

Current Literature of Animal Morphology.

The instructors and advanced students hold weekly meetings at which reports are made on important current papers, followed by informal discussion. Although the meetings are open to all, the membership is restricted.—*One hour a week, throughout the year.*

Original Work in Animal Morphology: invertebrate morphology, and vertebrate comparative anatomy, embryology, and histology.

Definite problems are assigned and worked out under the constant supervision of the instructors. The locality affords exceptional advantages for work on vertebrate embryology (Petromyzon, several Teleosts, Amia, Acipenser, Amblystoma, and other forms are under control) and for faunistic or experimental studies on invertebrates. Students intending to begin this work should confer with the professor in charge as early as the preceding spring in order that they may have time in which to prepare necessary material. Although the course is under the general supervision of Professor REIGHARD, some of the work may be under the immediate control of Assistant Professor HUBER or Dr. WARD. *Hours arranged with instructors, throughout the year.*

Assistant Professor HUBER:—

Microscopic Anatomy of the Brain and Special Sense Organs.

This course presupposes a knowledge of mammalian (or human) anatomy, including dissection. It must be preceded or accompanied by a course in microscopic technique. Work in vertebrate embryology, though not indispensable, is advised.—*Five hours a week, first or second semester.*

Original Work in Animal Morphology.

See above.

Dr. WARD:—

Field Club Work, and Original Work in Animal Morphology.

See above.

B. FOR GRADUATES AND UNDERGRADUATES.

Professor REIGHARD:—

The Comparative Embryology and Anatomy of Vertebrates.

The work in embryology, which precedes the anatomy, begins with a study of the early stages of fishes and amphibia and concludes with detailed work on the chick and the rabbit. In anatomy a few type forms are dissected and preparations of many other forms are studied. The lectures are illustrated by charts and preparations especially designed for the purposes of this course.—*Five hours a week, throughout the year.*

This work may be advantageously preceded by the undergraduate courses in mammalian anatomy and histology (courses 4, 5, 6, and 7, University Calendar for 1892-93, pages 85 and 86), though these courses are not required.

Dr. WARD:—

Invertebrate Morphology.

The lectures treat of the comparative anatomy and ontogeny of invertebrates. The laboratory work includes a series of forms which supplement that studied in the course in general biology. Students are required to prepare and deliver lectures on assigned topics.—*Three hours a week, throughout the year.*

BOTANY.

Graduate and undergraduate students who have taken a full year's work in general biology or the corresponding elementary courses in botany are offered the advanced and special courses named below. All of these require practical laboratory work and use of the reference library.

Professor SPALDING*:—

Morphology of the Higher Plants.

Lectures will be given and subjects assigned for investigation and reports.—*Three hours a week, first semester.*

Principles of Classification.

Three hours a week, second semester.

Assistant Professor NEWCOMBE:—

Vegetable Histology.

Studies will be made of the developmental history of chromato-

* Professor Spalding has leave of absence for the year 1893-94, and the courses announced for him will be omitted. During the absence of Professor Spalding the department of botany will be under the direction of Assistant Professor NEWCOMBE.

phores, the phenomena of karyokinesis and fertilization, and other subjects involving the application of modern histological methods.—*Five hours a week, first semester.*

Comparative Anatomy and Physiology of Phanerograms.

Investigation of special problems.—*Five hours a week, second semester.*

Mr. JOHNSON:—

Cryptogamic Botany.

A study of fresh water and marine algæ.—*Five hours a week, first semester.*

Cryptogamic Botany.

A study of fungi. Instruction will be given in culture methods and collections will be made.—*Five hours a week, second semester.*

PHYSIOLOGY.

The advanced work in physiology presupposes a knowledge of mammalian anatomy, including histology, and the elements of physics and chemistry. The required training is to be got from such courses as 4 and 5 in animal morphology (or courses in descriptive human anatomy and practical anatomy), 1 and 2 in physics, 1, 2, and 4 in general chemistry, and 10 in organic chemistry (described in the University Calendar for 1892-93, pages 75 to 85). Ability to read German is indispensable, and French is desirable, for students taking physiology as a major study for an advanced degree, though in some cases a candidate may be considered qualified to begin his advanced work prior to the completion of these requirements.

Professor LOMBARD:—

Lectures and Recitations.

Five hours a week, throughout the year.

Laboratory Course.

Three times a week, for one-third of a semester.

Physiological Experimentation.

One hour a week, for one semester.

Physiological Research and Collateral Reading.

Arranged to meet the wants of students who take physiology as a major study.

ENGINEERING.

Nearly all the instruction provided in the engineering department consists of courses that are required for the undergraduate degree; but the following courses offer an opportunity for graduates to do research work for a second degree. In marine engineering the instruction will comprise

a study of marine steam engines and propelling instruments, the hydraulics of ship-building, buoyancy, metacentre, stability and trim, weight and centre of gravity, waves and resistance, propulsion by sails and steam engines, laying-off and taking-off, and other topics. The courses in electrical engineering are included with physics, page 31. In each case the graduate will receive special advanced instruction suited to his individual needs.

Professor COOLEY:—

Machinery and Mill Work: advanced course.

A study of the installation of plants of machinery with comparison of the results obtained in practice from different systems.—*Two hours a week, second semester.*

Naval Architecture.

Hours arranged with instructor, first semester.

Marine Engines.

Hours arranged with instructor, second semester.

Ship-Building.

Hours arranged with instructor, second semester.

Professor COOLEY and Assistant Professor WAGNER:—

Experimental Laboratory Work: advanced course.

Measurements of power and efficiency of secondary machines.—*Hours arranged with instructor, first semester.*

Steam Engineering: advanced course.

Devoted largely to testing steam machinery and reporting on the tests.—*Hours arranged with instructor, second semester.*

Assistant Professor WAGNER:—

Thermodynamics: advanced course.

Hot air and gas engines; air compressors and refrigerating machines. The work consists largely in a comparison of experimental data with the deductions derived from theory.—*Two hours a week, first semester.*

UNIVERSITY OF MICHIGAN

DEPARTMENT OF LITERATURE, SCIENCE, AND THE ARTS

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ANNOUNCEMENT

OF

THE GRADUATE SCHOOL

1894-95

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ANN ARBOR, MICH.

PUBLISHED BY THE UNIVERSITY

1894



UNIVERSITY OF MICHIGAN  
DEPARTMENT OF LITERATURE, SCIENCE, AND THE ARTS



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## CALENDAR.

1894.

- Sept. 24-28. *Examination for Admission to the Department of Literature, Science, and the Arts.*
- Oct. 1. FIRST SEMESTER BEGINS IN ALL DEPARTMENTS OF THE UNIVERSITY.
- Nov. —. Thanksgiving Recess of three days, beginning Tuesday evening, in all Departments.
- Dec. 21. (Evening.) Holiday Vacation begins in all Departments.

1895.

- Jan. 8. Exercises resumed.
- Feb. 15. (Evening.) FIRST SEMESTER CLOSES.
- Feb. 18. SECOND SEMESTER BEGINS.
- April 12. (Evening.) Recess begins, ending April 22 (evening).
- June 27. COMMENCEMENT IN ALL DEPARTMENTS OF THE UNIVERSITY.

**FACULTY**  
**OF THE**  
**DEPARTMENT OF LITERATURE, SCIENCE, AND THE ARTS.**

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**Professors and Assistant Professors.**

JAMES B. ANGELL, LL.D., *President.\**

ALBERT B. PRESCOTT, PH.D., M.D., *Director of the Chemical Laboratory, and Professor of Organic Chemistry.*

REV. MARTIN L. D'OOGHE, LL.D., *Dean, and Professor of the Greek Language and Literature.*

CHARLES E. GREENE, A.M., C.E., *Professor of Civil Engineering.*

WILLIAM H. PETTEE, A.M., *Professor of Mineralogy, Economic Geology, and Mining Engineering.*

JOSEPH B. STEERE, PH.D., *Professor of Zoölogy.*

EDWARD L. WALTER, PH.D., *Professor of Romance Languages and Literatures.*

ISAAC N. DEMMON, A.M., *Professor of English and Rhetoric.*

ALBERT H. PATTENGILL, A.M., *Professor of Greek.*

MORTIMER E. COOLEY, M.E., *Professor of Mechanical Engineering.*

WOOSTER W. BEMAN, A.M., *Professor of Mathematics.*

VICTOR C. VAUGHAN, PH.D., M.D., *Professor of Hygiene and Physiological Chemistry, and Director of the Hygienic Laboratory.*

CHARLES S. DENISON, M.S., C.E., *Professor of Descriptive Geometry, Stereotomy, and Drawing.*

HENRY S. CARHART, LL.D., *Professor of Physics, and Director of the Physical Laboratory.*

RAYMOND C. DAVIS, A.M., *Librarian.*

VOLNEY M. SPALDING, A.B., *Professor of Botany.*

HENRY C. ADAMS, PH.D., *Professor of Political Economy and Finance.*

CALVIN THOMAS, A.M., *Professor of Germanic Languages and Literatures.*

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\* The President lectures upon International Law and the History of Treaties.

BURKE A. HINSDALE, LL.D., *Professor of the Science and the Art of Teaching.*

RICHARD HUDSON, A.M., *Professor of History.*

ALBERT A. STANLEY, A.M., *Professor of Music.*

JOHN DEWEY, PH.D., *Professor of Philosophy.*

FRANCIS W. KELSEY, PH.D., *Professor of the Latin Language and Literature.*

OTIS C. JOHNSON, PH.C., A.M., *Professor of Applied Chemistry.*

PAUL C. FREER, PH.D., M.D., *Professor of General Chemistry, and Director of the Laboratory of General Chemistry.*

ANDREW C. McLAUGHLIN, A.B., LL.B., *Professor of American History.*

JOSEPH B. DAVIS, C.E., *Professor of Geodesy and Surveying.*

ASAPH HALL, JR., PH.D., *Professor of Astronomy, and Director of the Observatory.*

ISRAEL C. RUSSELL, M.S., C.E., *Professor of Geology.*

WARREN P. LOMBARD, A.B., M.D., *Professor of Physiology and Histology.*

\*JACOB E. REIGHARD, PH.B., *Professor of Animal Morphology.*

THOMAS C. TRUEBLOOD, A.M., *Professor of Elocution and Oratory.*

JAMES A. CRAIG, PH.D., *Professor of Oriental Languages.*

JOHN C. ROLFE, PH.D., *Junior Professor of Latin.*

FREDERICK G. NOVY, M.D., Sc.D., *Junior Professor of Hygiene and Physiological Chemistry.*

GEORGE HEMPL, PH.D., *Junior Professor of English.*

EDWARD D. CAMPBELL, B.S., *Junior Professor of Metallurgy and Metallurgical Chemistry.*

FRED M. TAYLOR, PH.D., *Junior Professor of Political Economy and Finance.*

PAUL R. DE PONT, A.B., B.S., *Registrar, and Assistant Professor of French.*

CLARENCE G. TAYLOR, B.S., *Superintendent of Shops in Engineering Laboratory.*

JOSEPH H. DRAKE, A.B., *Assistant Professor of Latin.*

FRED N. SCOTT, PH.D., *Assistant Professor of Rhetoric.*

FRANK N. COLE, PH.D., *Assistant Professor of Mathematics.*

ALEXANDER ZIWET, C.E., *Assistant Professor of Mathematics.*

GEORGE W. PATTERSON, JR., A.M., S.B., *Assistant Professor of Physics.*

GEORGE A. HENCH, PH.D., *Assistant Professor of German.*

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\* Absent on leave in 1894-95.



FRANK C. WAGNER, A.M., B.S., *Assistant Professor of Mechanical Engineering.*

GOTTHELF C. HUBER, M.D., *Assistant Professor of Histology.*

ALVISO B. STEVENS, Ph.C., *Assistant Professor of Pharmacy.*

GEORGE H. MEAD, A.B., *Assistant Professor of Philosophy.*

FREDERICK C. NEWCOMBE, Ph.D., *Acting Assistant Professor of Botany.*

HERMAN V. AMES, Ph.D., *Acting Assistant Professor of American History.*

### Instructors and Assistants.

JOSEPH L. MARKLEY, Ph.D., *Instructor in Mathematics.*

MORITZ LEVI, A.B., *Instructor in French.*

FRED MORLEY, C.E., *Instructor in Descriptive Geometry and Drawing.*

ELMER A. LYMAN, A.B., *Instructor in Mathematics.*

GEORGE O. HIGLEY, M.S., *Instructor in General Chemistry.*

ALFRED H. LLOYD, A.M., *Instructor in Philosophy.*

JONATHAN A. C. HILDNER, A.M., *Instructor in German.*

DAVID M. LICHTY, M.S., *Instructor in General Chemistry.*

JOHN O. REED, Ph.M., *Instructor in Physics.*

BENJAMIN P. BOURLAND, A.M., *Instructor in French.*

JOHN R. EFFINGER, JR., Ph.B., *Instructor in French.*

LORENZO N. JOHNSON, A.M., *Instructor in Botany.*

HERBERT F. DE COU, A.M., *Instructor in Greek.*

ERNST H. MENSEL, A.M., *Instructor in German.*

LAWRENCE A. MCLOUTH, A.B., *Instructor in German.*

EARLE W. DOW, A.B., *Instructor in History.*

POMEROY LADUE, B.S., *Instructor in Mathematics.*

EUGENE LESER, Ph.D., *Instructor in French.*

GEORGE E. DAWSON, A.B., *Instructor in English.*

MOSES GOMBERG, M.S., *Instructor in Organic Chemistry.*

CLARENCE G. WRENTMORE, B.S., *Instructor in Descriptive Geometry and Drawing.*

KARL E. GUTHE, Ph.D., *Instructor in Physics.*

TOBIAS DIEKHOF, A.B., *Instructor in German.*

GEORGE A. MILLER, Ph.D., *Instructor in Mathematics.*

MARSHALL S. BROWN, A.M., *Instructor in History.*

WILLIAM F. EDWARDS, B.S., *Instructor in the Chemical Laboratory.*

SIDNEY D. TOWNLEY, M.S., *Instructor in Astronomy.*

DEAN C. WORCESTER, A.B., *Instructor in Animal Morphology.*

MAX WINKLER, Ph.D., *Instructor in German.*

HENRY A. SANDERS, A.B., *Instructor in Latin.*

CLARENCE L. MEADER, A.B., *Instructor in Latin.*

ALICE L. HUNT, *Assistant in Drawing.*

EUGENE H. ROBERTSON, PH.M., *Assistant in Physiological Chemistry.*

CHARLES H. COOLEY, A.B., *Assistant in Political Economy.*

FRANK H. DIXON, PH.B., *Assistant in Political Economy.*

HARRIET L. MERROW, A.M., *Assistant in Botany.*

HERBERT S. JENNINGS, B.S., *Assistant in Vertebrate Morphology.*

JOHN B. JOHNSTON, PH.B., *Assistant in Invertebrate Morphology.*

LOUIS A. STRAUSS, B.L., *Assistant in English.*

# ANNOUNCEMENT OF THE GRADUATE SCHOOL.

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## GENERAL INFORMATION.

### **The University of Michigan.**

The University of Michigan is a part of the educational system of the State, and derives from the State, in one way or another, the greater part of its revenue. The University comprises the Department of Literature, Science, and the Arts, and five professional schools, each of which has its own Faculty and issues each year a separate departmental Announcement. The various faculties aggregated, in 1893-94, one hundred and twenty-one officers of instruction, besides numerous assistants, some of whom participate in the work of teaching. Nearly twenty-seven hundred students, representing forty-five States and Territories, and nineteen foreign countries, were in attendance.

### **The Department of Literature, Science, and the Arts.**

The Department of Literature, Science, and the Arts combines under one organization the different lines of work that are often represented elsewhere by the names college, scientific school, and school of technology. Its faculty numbered, in 1893-94, eighty-three teachers. The students in attendance numbered over fourteen hundred, of whom seventy-seven were graduates. The presence of such a number of graduate students, taken with the fact that high specialization of work is not uncommon among undergraduates, tends to create a genuine university atmosphere, and to assure the advanced student of intellectual comradeship.

### **The Libraries.**

The various libraries of the University contain about 85,800 volumes, and include a number of important special collections. Among these are the McMillan Shakespeare Library, 3,525 volumes; the Parsons Library (political science), 4,325 volumes; the Hagerman Collection (history and political science), 2,600 volumes, and a Goethe Library of

862 volumes. The general reading room seats two hundred and sixteen readers, and separate rooms are provided for advanced students to work in, with the necessary books close at hand. Under certain restrictions graduate students have access to the book rooms. The library takes about two hundred periodicals, and is open, in term time, twelve and one-quarter hours daily, except on Sundays and legal holidays.

### **The Laboratories.**

The University has an observatory and a large number of laboratories more or less fully equipped for routine instruction and for original research. These laboratories are (omitting those connected exclusively with the work of the Medical and Dental Schools): the Botanical, Chemical, Engineering, Geological, Histological, Hygienic, Morphological, Physical, Physiological, Psychological, and Zoölogical. For a fuller account of them and their various resources, as also of the University collections for the study of art, archæology, ethnology, mineralogy, palæontology, systematic zoölogy, etc., consult the annual Calendar, which may be had gratis on application to Mr. James H. Wade, Secretary of the University.

### **The Scientific Societies.**

There are connected with the University a number of voluntary scientific organizations which add not a little to the graduate student's opportunity for scientific training. The membership of these societies consists usually of University teachers and advanced students who are pursuing a common specialty. They are variously organized and meet weekly, fortnightly, or monthly, as the case may be, for the reading and discussion of formal papers, for reports upon observation and experiment, reviews of recent technical literature, etc.

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## **ORGANIZATION OF GRADUATE WORK.**

### **The Graduate School.**

The Graduate School was organized in the spring of 1892 in connection with the Department of Literature, Science, and the Arts. Its purpose is to bring into increased prominence the numerous advanced courses offered in that department,—courses that have developed during the past few years from the continual extension of the elective system,—and to recognize and announce them as something distinct from the work of an ordinary college course. It aims to make provision for a more systematic and efficient administration of this higher work, and, so far as possible, for the separate instruction of graduate students. It also aims to lay foundations for the future development of university (as distin-

guished from collegiate) work. The management of the School is entrusted to an Administrative Council, consisting of the heads of departments of instruction, with the President of the University as chairman.

The regulations of the University respecting graduate work, that were formerly in force, have been modified in a few particulars by the Council, and it is possible that still further changes may be made in the year to come. The more important of these regulations are explained in the pages that follow.

### **The University System.**

Every graduate student who is a candidate for a higher degree, works upon the so-called 'university system,' the essential features of which are specialization of study, a final examination, and a thesis. The student selects a 'major study' and, in general, two 'minor studies,' his selection being subject, however, to the approval of the Council. When the choice has been made and approved, the student's work is henceforth under the immediate supervision of a committee consisting of those professors who have charge of the studies chosen, the one having charge of the major study being chairman. This committee arrange a course of study suited to the desires, needs, and previous attainments of the student, assist him in the choice of a subject for a thesis, pass judgment upon his thesis when it is written, conduct his examination, and, if he passes, report him to the Council as worthy of the degree sought. The nature of the work prescribed, and of the committee's oversight, varies more or less according to the subjects chosen, the degree sought, and the previous attainments of the student. The work may consist of attendance upon certain specified courses of study, of reading to be done privately and reported upon, or of an original research to be carried on more or less independently. The requirement of a thesis is sometimes waived in the case of a candidate for a *Master's* degree. It may be added also that for the *Master's* degree the Council may, at their discretion, approve a course of study which does not confine the candidate rigorously to a major and two minor studies.

Graduate students who do not wish to work for a higher degree are admitted to any course offered in the Department upon satisfying the professor in charge that they are qualified to pursue the work to advantage.

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## **THE HIGHER DEGREES.**

### **Degrees Conferred.**

The higher degrees conferred in the Department of Literature, Science, and the Arts, are those of Master of Arts, Master of Science, Master of Philosophy, Master of Letters, Doctor of Philosophy, Doctor of Science,

Doctor of Letters, Civil Engineer, Mechanical Engineer, Mining Engineer, and Electrical Engineer.

### **The Masters' Degrees.**

A Bachelor of this University, or of any other reputable university or college, may become a candidate for the corresponding Master's degree, and may be recommended for the degree after one year's residence at the University, provided he pass a satisfactory examination on the course of study prescribed by his committee. A thesis may, or may not, be included in the requirements for a degree, as the committee in charge of the student's work may determine.

The practice of allowing graduates of this University to enter upon studies *in absentia* as candidates for a Master's degree, has been discontinued. But a graduate who has already completed a considerable portion of the term of residence prescribed for a Master's degree, may be allowed to continue his studies for the degree, without further residence at the University, on such conditions as the Administrative Council may determine in each case. *This privilege is restricted to graduates of this University.*

Students properly qualified may be permitted to pursue at the same time studies for a master's degree, and studies in any of the professional schools, on condition that the term of study and residence in the Graduate School be extended to cover two years instead of one.

### **The Doctors' Degrees.**

1. The degree of Doctor of Philosophy is open to persons that have received the degree of Bachelor of Arts, or of Bachelor of Philosophy; the degree of Doctor of Science to persons that have received the degree of Bachelor of Science; and the degree of Doctor of Letters to persons that have received the degree of Bachelor of Letters; but no student will be accepted as a candidate for the Doctor's degree who has not a knowledge of French and German sufficient for purposes of research.

2. It is not intended that the Doctors' degrees shall be won merely by faithful and industrious work for a prescribed time in some assigned course of study, and no definite term of required residence can be specified. As a rule, three years of graduate study will be necessary, the last two semesters of which must be spent at this University. The period of three years, however, may be shortened in the case of students who, as undergraduates, have pursued special studies in the direction of their proposed graduate work.

3. No student will be enrolled as a candidate for the Doctor's degree until he has been in residence as a graduate student for at least one year. [This rule may be waived in the case of those who come properly ac-

credited from a Graduate School of some other University, and of those who, as undergraduates in this University, have shown special proficiency in the line of their proposed graduate work.]

4. A student wishing to become a candidate for the Doctor's degree must make a formal application to be so enrolled at least two semesters prior to the time of presenting himself for examination.

5. A candidate for a Doctor's degree must take a major study that is substantially co-extensive with some one department of instruction in the University. He must also take two minor studies, one of which may be in the same department as the major, but involving a more thorough treatment of the same. Both minors must be cognate to the major, and all studies must be subject to the approval of the Administrative Council.

6. THE THESIS.—The thesis is of great importance. It must exhibit creditable literary workmanship and a good command of the resources of expression, but it must depend for acceptance more upon its subject-matter than upon its formal or rhetorical qualities. It must be an original contribution to scholarship or to scientific knowledge. The inquiry should be confined within narrow bounds. The treatment should be as concise as the nature of the subject permits, and show familiarity with the history of the problem treated, with the literature bearing upon it, and with the latest methods of research applicable to it. Every thesis should contain a clear introductory statement of what it is proposed to establish or investigate, and likewise a final resumé of results. It should also be accompanied by an index of contents and a bibliography of the subject. It is expected that the preparation of an acceptable thesis will usually require the greater part of one academic year.

### **The Higher Degrees in Engineering.**

The degree of Civil Engineer may be conferred upon Bachelors of Science of this University who have taken the degree for a course in Civil Engineering, if they furnish satisfactory evidence that they have pursued further technical studies for at least one year, and, in addition, have been engaged in professional work, in positions of responsibility, for another year. The first of the above requirements may be satisfied by pursuing at the University, under the direction of the Council, a prescribed course of study for an amount of time, not necessarily consecutive, equivalent to an academic year. If the candidate does not reside at the University, his course of study must be approved in advance by the Professor of Civil Engineering, and he must prepare a satisfactory thesis on some engineering topic, to be presented, together with a detailed account of his professional work, one month, at least, before the annual Commencement at which he expects to secure the degree.

The conditions on which the degrees of Mechanical Engineer, Mining

Engineer, and Electrical Engineer are conferred, as second degrees, upon Bachelors of Science of this University who have taken the degree for a course in Mechanical Engineering, Mining Engineering, or Electrical Engineering, are analogous in character to those prescribed for the degree of Civil Engineer.

### **Special Regulations Relating to the Higher Degrees.**

1. Applicants for an advanced degree are required to announce to the Council, through the President, as early as the fifteenth of October, the particular branches of study to which they wish to give special attention. The supervision of their work will then be entrusted to the proper committee.

2. The subject of the thesis for a Doctor's degree must be chosen, and must be approved by the committee concerned, as early as the first of November, and the subject of the thesis, when required for a Master's degree, must be chosen and approved as early as the first of December, of the college year in which the applicant expects to take the degree.

3. It is required that, so far as the resources of the University permit, the thesis be upon a subject requiring research.

4. The thesis must be completed and put into the hands of the chairman of the proper committee as early as the first of May of the year in which the applicant expects to take the degree.

5. The thesis must be prepared for close scrutiny with reference not only to its technical merits, but also to its merits as a specimen of literary workmanship. It must be preceded by an analytical table of contents, and a carefully prepared account of the authorities made use of.

6. The thesis must be read and defended in public at such time as the Council may appoint; and, in case of a Master's degree, a bound copy, either written or printed, must be deposited in the University library.

7. Candidates for the degree of Doctor of Philosophy, Doctor of Science, or Doctor of Letters, in case of the acceptance of their theses, are also required to have the accepted theses printed, in full or in part as may be approved by the responsible committee, and to present twenty-five copies of the same to the University library. To guarantee the printing of the thesis every candidate for the Doctor's degree will be required to deposit with the Treasurer of the University, between the date of the acceptance of his thesis and the time fixed for his examination, the sum of fifty dollars, which deposit will be returned to him in case of failure to pass his examination, or whenever he shall cause his thesis to be printed at his own expense, or shall have it published in a form and under auspices approved by the responsible committee.

In the printing of the thesis at his own expense the candidate will be expected to use good substantial paper and slightly topography. A page four inches by six, with outside margins of at least one inch is recommended.



## ADMISSION AND REGISTRATION.

All applicants for admission to the Graduate School must first report to the President and present their credentials.

The privileges of the school are open to graduates of the Department of Literature, Science, and the Arts of this University, and to graduates of other universities and colleges who satisfy the Administrative Council that they are qualified to pursue with profit the advanced courses of study offered in the school.

Graduates of institutions where the undergraduate courses of study are not substantially equivalent to the course prescribed at this University will ordinarily be required to do an additional amount of undergraduate work, or to prolong their term of residence, before being admitted to full candidacy for a higher degree.

Graduates of this University, or of other institutions, who do not wish to become candidates for a degree, may be admitted and registered as special resident graduates.

Graduates of other institutions who are candidates for a bachelor's degree in the Department of Literature, Science, and the Arts, are not registered in the Graduate School.

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## FEES AND EXPENSES.

**Matriculation Fee.**—Every student before entering any department of the University is required to pay a matriculation fee. This fee, which, for citizens of Michigan, is ten dollars, and for those who come from any other state or country, twenty-five dollars, is paid but once, and entitles the student to the privileges of permanent membership in the University.

**Annual Fee.**—In addition to the matriculation fee, every student has to pay an annual fee for incidental expenses. This fee in the Department of Literature, Science, and the Arts is, for Michigan students, twenty-five dollars; for all others, thirty-five dollars. It is paid the first year of residence at the University, and every year of residence thereafter. Resident graduates are required to pay the same annual fee as undergraduates. Graduate students studying *in absentia* for a master's degree pay an annual fee of ten dollars.

The matriculation fee and the annual fee must be paid at the beginning of the academic year. A by-law of the Board of Regents provides that no student or graduate shall be allowed to enjoy the privileges of the University until he has paid all fees that are due.

**Laboratory Expenses.**—Students who pursue laboratory courses of study are required to pay for the materials and apparatus actually consumed by them. The deposits required in advance are different in the

different courses, ranging from one to twenty dollars. The laboratory expenses of students will vary with their prudence and economy. Experience has shown that in the chemical laboratory the average expense for all courses is about one dollar and twenty cents a week.

**Diploma Fee.**—The fee for the diploma given on graduation is ten dollars, and the by-laws of the Board of Regents prescribe that no person shall be recommended for a degree until he has paid all dues, including the fee for diploma.

**Other Expenses.**—Students obtain board and lodging in private families for from three to five dollars a week. Clubs are also formed in which the cost of board is from one dollar and a half to two dollars and a half a week. Room rent varies from one dollar to three dollars a week for each student. The annual expenses of students, including clothing and incidentals, are, on the average, about three hundred and seventy dollars.

There are no dormitories, no commons, and no stipends (with the exception of one fellowship) connected with the University. Students on arriving in Ann Arbor can obtain information in regard to rooms and board by calling at the Steward's office.

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## COURSES OF INSTRUCTION.

The following list of advanced courses does not attempt in all cases to discriminate graduate from undergraduate instruction; the reason being that the possession of a Bachelor's degree may mean much or little as regards a student's proficiency in a particular subject. With a few exceptions, the courses here mentioned all presuppose a somewhat extensive preliminary study of the subject, a study covering from one to six years, according to the circumstances. In most instances the attempt is made to indicate, in terms of both time and work, the amount of preparation required for entrance upon the courses described. Many of the courses are advanced electives which are open to undergraduates, but have been shown by experience to be suited to the needs of many graduates. Different departments of instruction have adopted different modes of announcing and explaining their work. For further information reference may be made directly to the head of the department concerned.

### GREEK.

The courses here announced presuppose, in general, four years' previous study of Greek, viz., the usual preparatory course of two years, and two years of collegiate study devoted to the history of Greek literature and to reading from Lysias, Xenophon, Homer, Demosthenes, the Tragic Poets, and Aristophanes.

## Professor D'OUGE:—

## 'Teachers' Seminary.

This course is intended to give students who expect to teach Greek training in teaching the elements of inflection and syntax. In the first semester, lectures will be given on the chief results of the modern comparative treatment of Greek sounds and inflections. In the second semester, the course will include the writing of Greek Prose, and a discussion of the principles of Greek Syntax.—*Two hours a week, throughout the year.*

## Seminary in Tragedy.

The Electra of Sophocles and the Medea of Euripides will be read and interpreted by each member of the class in turn. The Persians of Aeschylus will be read and interpreted by the instructor. The reading will be accompanied by a discussion of the principles of Greek dramatic art, and by a study of the chief points of textual criticism.—*Three hours a week, first semester.*

## The History of Greek Art from the beginnings to the Roman Period.

Von Reber's History of Ancient Art and Collignon's Manual of Greek Archæology will be made the basis of a more general study.—*Three hours a week, first semester.*

## The Olympian and Pythian Odes of Pindar.

*Two hours a week, first semester.*

## Greek Antiquities.

Lectures on the public and private life of the Greeks, illustrated by stereopticon views.—*One hour a week, first semester.*

## Introduction to Homer.

Study of the dialect, metre, and peculiarities of the style and diction of Epic poetry. This course is intended especially for graduate students.—*Three hours a week, second semester.*

## Professor PATTENGILL:—

## Plato.

The Euthydemus and Symposium, with studies of other dialogues.—*Three hours a week, first semester.*

## The Bucolic Poets: Theocritus, Bion, and Moschus.

*Four hours a week, second semester.*

Professor CRAIG:—

Hellenistic Greek.

Gospel of John; I Corinthians.—*Two hours a week, first semester.*

Hellenistic Greek.

Epistle to the Galatians; selections from the Old Testament and the Old Testament Apocrypha.—*Two hours a week, second semester.*

Mr. DE COU:—

Studies in the Greek Rhetoricians, with interpretations of selections from Aristotle, Hermogenes, and the Treatise *περὶ ὁψούζ*.

*Two hours a week, first semester.*

Greek Writing.

Sidgwick's or Wilkins's Greek Prose.—*Two hours a week, second semester.*

Studies in the Greek Dialects, Texts, and Inscriptions.

*Two hours a week, second semester.*

The courses offered by Mr. De Cou are intended primarily for graduate students, but undergraduates of exceptional attainments may be admitted to them.

LATIN.

The courses here announced presuppose, in general, six years' previous study of Latin, viz., the usual preparatory course of four years, and two years of collegiate study devoted to Livy, Horace, Terence, sight reading, Latin composition, and the systematic study of Roman literature.

Professor KELSEY:—

Graduate Seminary.

Critical study of selected portions of the *De Rerum Natura* of Lucretius. Open to graduate students only.—*Two hours a week, throughout the year.*

Teachers' Seminary.

Interpretation of selected portions of Caesar, Cicero, and Vergil, with investigation of syntactical subjects.—*Three hours a week, throughout the year.*

Introduction to Classical Philology. Lectures.

A brief outline of the history and present condition of classical studies is presented, followed by an extended discussion of the methods employed in classical philology. Attention is also paid to the bibliography of the subject. Several lectures in this course will be given

by other members of the classical faculty.—*Three hours a week, first semester.*

### Latin Inscriptions.

Reading of inscriptions of different periods from squeezes and facsimiles. Interpretation of inscriptions with special reference to the study of life and society under the Early Empire.—*Three hours a week, second semester.*

### Reports on the Current Literature of Latin Philology.

The professors and instructors meet regularly for reports on the contents of the technical journals. Graduate students are admitted to a share in this work.—*One hour a week (Tuesday evening), throughout the year.*

### Professor ROLFE:—

#### Seminary in Latin Masterpieces.

Study of selected masterpieces of Roman literature. This course is limited to eight students.—*Three hours a week, first semester.*

#### Latin Grammar. Lectures.

*Four hours a week, second semester.*

#### Latin Writing.

Attention is given not only to correctness of expression but also to matters of style and the finer distinctions of the language.—*Two hours a week, first semester; three hours a week, second semester.*

#### The Letters of Cicero.

Interpretation of selected letters, with study of the Latin epistolary style.—*Three hours a week, second semester.*

### Assistant Professor DRAKE:—

#### Suetonius and Velleius Paterculus.

Lectures and interpretations.—*Three hours a week, first semester.*

#### Historical Proseminary.

Study of historical subjects from the sources. Period of the Early Empire.—*Three hours a week, second semester.*

### Mr. MEADER:—

#### The Institutes of Gaius and Justinian.

Interpretation of the text, with special study of the technical terms of the Roman Law.—*Three hours a week, second semester.*

### Mr. SANDERS:—

#### Minor Latin Poets: Propertius and the Elegiac Group.

Interpretations.—*Three hours a week, first semester.*

## SEMITICS.

Courses will be given in Hebrew and Assyrian, and also in Arabic and Aramaic provided there be a sufficient number of applicants for these subjects who have already pursued the study of Hebrew or Assyrian.

In the beginners' courses the method pursued is a modification of the so-called "inductive method." Much importance is attached to the acquisition of a vocabulary and to scientific method of study from the outset.

In the case of advanced students, in addition to the lectures, direction and personal assistance will be rendered by the instructor in connection with the work required of the student in private. The University Library contains a number of the most valuable works needed for advanced work in this department.

In addition to the linguistic courses the following courses in Semitic History will also be given:

(1) History of the discovery of the Assyro-babylonian monuments and their decipherment; and the history of Babylonia and Assyria as derived from the monuments.

(2) History of the Jews from the earliest times to the Christian Era.

The work in Semitics will be conducted by Professor CRAIG.

## FRENCH.

Students will not be considered as taking graduate work in French, whether graduates of this University or of any other institution, who have not had the equivalent of at least Courses 1, 2, 3, 6, 7, 8, 20, and 21, as given in the undergraduate department of the University and described in the University Calendar for 1893-94, pages 55-57. These courses include grammar and composition, the reading of classic and modern prose, and the classic and modern drama.

Graduate work is either chiefly literary or chiefly linguistic, but it is expected that for the Doctor's degree at least, and it is advised that for the Master's degree as well, some work shall be done in both directions.

For students who choose to direct their work chiefly to the literature, opportunity will be given in the *first semester* of 1894-95 to study the Eighteenth Century dramatists, the Sixteenth Century literature, and some of the leading French philosophical writers; in the *second semester* the Seventeenth Century literature, the pre-revolutionary literature, Voltaire, Montesquieu, Rousseau, etc., the romantic movement at the beginning of the present century, and the satirical spirit in French literature. Private work will be assigned when it is thought desirable by the Professor in charge.

The oldest French literature will be studied in connection with the study of Old French, which will be continued *throughout the year*.

A teachers' course in French will be open to candidates for a Master's degree who intend to teach that language.

The courses in French will be given by, or under the direction of, Professor WALTER.

### ITALIAN.

Students will not be considered as taking graduate work in Italian, who have not had the equivalent of Courses 1 and 2 as described in the University Calendar for 1893-94, pages 57 and 58. In 1894-95 courses in Dante's *Divina Commedia* and *Vita Nuova* will be offered.

The courses in Italian will be given by, or under the direction of, Professor WALTER.

### SPANISH.

Students will not be considered as taking graduate work in Spanish, who have not had the equivalent of Courses 1 and 2 as described in the University Calendar for 1893-94, page 58. In 1894-95, dramas of Lope and Calderon will be offered.

The courses in Spanish will be given by, or under the direction of, Professor WALTER.

### GERMAN.

The undergraduate courses, not here mentioned, provide for four years' study, five hours a week. Considerably less than that, however, is a satisfactory preparation for the courses described below:

Professor THOMAS:—

#### Goethe's Faust.

Recitations and lectures upon the interpretation of the text, Thomas's edition being used for Part I, Schröer's for Part II. The course is open to advanced undergraduates, but is suitable for graduates also. Graduates taking the course will, upon request, be organized into a separate class to meet once a week for the study of special problems in Faust-criticism.—*Two or three hours a week, throughout the year.*

#### Teachers' Course.

Intended specially for those, whether graduates or advanced undergraduates, who are preparing to teach German in secondary schools. Several kinds of work are carried on more or less simultaneously: (1) Critical study of selected masterpieces, with German essay; (2) Lectures and quizzes in German upon the history of modern German literature; (3) Lectures, reports, and discussions upon methods of teaching, text-books, etc.; (4) Lectures upon German grammar from a pedagogical point of view.—*Three hours a week, throughout the year.*

## History of German Literature.

Lectures accompanying systematic readings from Müller's German Classics. The period covered extends from the earliest times to the middle of the nineteenth century. The course is an advanced elective for undergraduates, but is suited to the needs of graduates that have never taken a general survey of German literature in its historical development.

## Graduate Seminary.

Original research. Open to graduates only.—*Once a week, one or two hours, throughout the year.*

Assistant Professor HENCH:—

## Old High German.

Introductory course. Text-books: Braune's Althochdeutsche Grammatik, 2nd ed., and Braune's Althochdeutsches Lesebuch, 3rd ed. Primarily for graduates.—*Three hours a week, second semester.*

## Historical and Comparative German Grammar.

First semester, phonology and morphology; second semester, syntax.—*Two hours a week, throughout the year.*

Mr. MENSEL.

## Middle High German.

Introduction to language and literature. Lectures and recitations. Text-book: Paul's Mittelhochdeutsche Grammatik, 3rd ed., and Weinhold's Mittelhochdeutsches Lesebuch, 4th ed. An advanced elective for undergraduates, but suitable for graduates who have not yet begun the study of Middle High German.—*Two hours a week, first semester.*

## The Nibelungenlied.

Reading, with lectures on language, mythological elements, and composition of the epic. Continuation of the last named course.—*Two hours a week, second semester.*

## GOTHIC.

Assistant Professor HENCH:—

## Introductory Course.

Wright's Primer. Primarily for graduates.—*Three hours a week, first semester.*

## Advanced Course.

Continuation of last named. Epistles and Skeireins as contained in Heyne's Ulfilas, 8th ed. Lectures on Historical Grammar based on



Kluge's *Vorgeschichte der altgermanischen Dialekte*.—*Two hours a week, second semester.*

### ENGLISH AND RHETORIC.

The advanced work of this department proceeds along three main lines:

1. *History and Philology of the English Language.* Opportunity is offered for (1) a detailed study of the phonology, morphology, and syntax of Old English;\* (2) a survey of the historical development of the language; (3) a special study of the spoken English of to-day.

2. *Literature.* In the seminary courses in English and American literature opportunity is offered, through reading and discussion, for original research bearing upon (1) the nature and meaning of the great movements in the history of literature; (2) the influence exercised upon English and American writers by the literature of other nations; (3) the interpretation of works of literary art in the light of established critical principles.

3. *Rhetoric.* A historical course in the development of rhetorical theory is offered. Advanced courses in elocution and oratory are also provided, involving the critical study of great orators, ancient and modern, and the application of the principles of formal logic by means of oral and written discussions.

The following courses (open also to undergraduates who are prepared to take them) will ordinarily be found adapted to the needs of graduate students.<sup>1</sup> In case of students who have taken these courses for their first degree, special advanced courses for graduate study are provided after conference with the candidate.

Professor DEMMON:—

#### English Literature Seminary.

Each student is expected, first, to present two papers during the semester, one an essay upon an assigned masterpiece, the other a critique of a fellow-student's essay; second, to participate each week in a general *ex tempore* discussion of the work under consideration; third, to read the entire list of works with which the course deals, together with such critical literature on each subject as there may be time for. The list of masterpieces is as follows: More's *Utopia*; Bacon's *Essays*; Milton's *Areopagitica*; Burke's *Reflections on the French Revolution*; Carlyle's *Sartor Resartus*; George Eliot's *Silas Marner*; Spenser's *Faery Queen*, Book I; Shakespeare's *Sonnets*; Milton's *Paradise Lost*; Dryden's *Absalom and Achitophel*; Pope's

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\*The term "Old English" is used in this Announcement for the period of English often called "Anglo-Saxon."

Essay on Man; Wordsworth's Excursion; Tennyson's Princess; Browning's Soul's Tragedy.—*First semester.*

### Shakespeare Seminary.

The method is similar to that in the preceding course. The plays selected are: A Midsummer Night's Dream; The Merchant of Venice; As You Like It; Twelfth Night; The Tempest; Richard III; the two parts of Henry IV; Henry V; Hamlet; Macbeth; Othello; King Lear; Coriolanus.—*Second semester.*

### American Literature Seminary.

Authors studied: Irving, Poe, Hawthorne, Bryant, Longfellow, Emerson, Thoreau, Bayard Taylor, Whittier, Holmes, Lowell, Howells and James. Representative works of all the authors named are studied, and an attempt is made to discover the distinctively American element by a comparative study with British authors.—*Second Semester.* When this subject is taken for an advanced degree, individual work is assigned for the first semester, upon which the candidate is expected to make weekly reports.

### Principles of Criticism.

Lectures. Candidates who take their major in English Literature are expected to take this course in connection with the seminary work in English Literature and Shakespeare.—*Throughout the year.*

Professor HEMPL:—

### Old-English Syntax.

The investigation of specific problems, together with a brief general survey of the subject.—*First semester.*

### Old-English Phonology and Morphology.

A study of early West-Saxon prose, with special reference to sounds and inflection.—*Second semester.*

### Historical English Grammar.

A general survey of the subject, and the investigation of the origin and development of impugned Modern-English idioms.—*First semester.*

### Old-English Poetry.

A study of early English literature, with special reference to the poetical monuments.—*Second semester.*

### Spoken English.

A study of colloquial English as distinguished from the English of books and of formal speech, and the investigation of the more important facts as to the fortunes of English speech in this country.—*Second semester.*

Students prepared to do advanced work in Old English may take the courses in Old-English syntax and in Old-English phonology and morphology. At the same time with the syntax, the general subject of historical English grammar may be taken up, to be followed by the study of the modern spoken language; but students who desire to make a study of early English literature will take instead the work in Old-English poetry, to be accompanied, at their choice, by the undergraduate course in Transitional and Early Middle English. Students not yet prepared to do advanced work in Old English will omit or defer the course in Old-English syntax, and will begin the subject with the undergraduates, preparing themselves for the two Old-English courses offered in the second semester.

Assistant Professor SCOTT:—

#### Development of Rhetorical Theory.

A historical and comparative study of the growth of rhetorical theory from Aristotle to the present time.—*Throughout the year.*

Professor TRUEBLOOD:—

#### Study of Great Orators, ancient and modern.

Lectures on methods of public address and sources of power. Study of representative selections. The method is similar to that in the English Literature Seminary.—*Throughout the year.*

#### Oral Discussions.

This course is designed to develop readiness of extemporization. It involves the application of the principles of formal logic and elocution in the discussion of leading topics of the day. Students are required to present briefs of the subjects discussed.—*Second semester.*

### HISTORY.

The University Calendar for 1893-94, pages 65 to 67, shows the general arrangement of the historical courses given in the Department of Literature, Science, and the Arts. Courses 1, 3, 4, 6, 7, and 8, there described, represent the fundamental work in history with which the graduate student, who has history for a major study, is expected to be acquainted, or which he will be expected to take before entering upon the strictly graduate work described below, though it is not necessary that all these courses be taken before entering the graduate school to study history. A great portion of the work of a graduate student will be individual research and investigation under the personal supervision of the professor in charge.

Professor HUDSON:—

### European History and Comparative Constitutional and Administrative Law.

The advanced work in these subjects includes,—

(a) The history of Europe since 1789. The French Revolution and the Empire of Napoleon are dealt with in the *first semester*. In the *second semester's* course a study is made of the national movement of the present century, including the unification of Italy and of Germany.

(b) Lectures throughout the year on Comparative Constitutional Law, dealing with the institutions of the more important European states, special attention being devoted to England, France, and the German Empire.

(c) A course for the comparative study of the administrative systems of the more important countries.

In addition to lecture courses seminars are organized for the advanced study of institutions.

Professor McLAUGHLIN:—

### American History and Constitutional Law.

Many graduate students find courses 3 and 4, as announced in the Calendar for 1893-94, suited to their needs. These courses, however, will not be sufficient for those who expect to take an advanced degree with American History for a major study.

The more advanced work includes,—

(a) A seminary in later American history designed to give instruction in methods of research and investigation of primary authorities.

(b) A course of topical study giving opportunity for a somewhat careful study of certain periods from the best secondary authorities. One aim of the course is to widen the student's knowledge of the bibliography of the subject.

(c) Constitutional Law. Graduate students selecting this line of work will be expected to study leading cases in the reports, and to read the best works on American political institutions. The aim is to give a knowledge of the constitution as it has been interpreted by the courts and is daily interpreted in action by the political departments.

### PHILOSOPHY.

On account of changes in the corps of instructors, no details of the courses to be offered in philosophy in 1894-95 can be given at the time this Announcement is issued. But the courses described below,

which were offered in 1893-94, will serve to show the general character of the graduate work provided in this department of instruction.

These courses presuppose instruction in logic, ethics, and general psychology; also a general introduction to philosophy and a somewhat extended study of the history of philosophy, ancient, mediæval, and modern. Candidates for a higher degree who have not had a preparation equivalent to this will be expected to take certain of the lower courses, either before entering upon, or in connection with, their graduate work. Advanced courses bearing upon the history of philosophy are also given in the departments of Greek, Latin, French, and German.

*Courses offered in 1893-94.*

A. HISTORY OF PHILOSOPHY.

Assistant Professor MEAD:—

The History of Philosophy.

A general outline of the subject from Thales to the present century. The course is designed to state the development of philosophical problems and concepts, and thus to give the student his bearings in philosophy. It is therefore highly advisable, if this course has not been taken before beginning graduate work, that it be taken at once upon beginning it.—*Three hours a week, throughout the year.*

Supplementary work in the History of Philosophy.

The object of this course is to introduce the student to the methods of investigation and discussion in the subject. Some special points of the general course are taken up and given more detailed consideration.—*One hour a week, throughout the year.*

Professor DEWEY:—

Movement of Thought in the Nineteenth Century.

Lectures upon the development of thought in the present century, beginning with Rousseau. The course is intended to correlate the philosophical movement of the century with political and literary developments; it is non-technical, and should, whenever possible, be taken as undergraduate work.—*Two hours a week, first semester.*

Dr. LLOYD:—

Contemporary Philosophy.

This course takes the subject up at a somewhat later date than the preceding course, and it is more technical in method. In 1893-94 it dealt particularly with the philosophic thought of Lotze and Edward Caird.—*Three hours a week, first semester.*

### The Philosophy of Spinoza.

Elwee's translation. Lectures, and study of the ethics.—*Two hours a week, second semester.*

### Special Study in Spinoza.

For the more detailed study of special points than the preceding course affords. These two courses will probably alternate with courses in Hegel's Logic (Wallace's translation).—*One hour a week, second semester.*

## B. PSYCHOLOGY.

Assistant Professor MEAD:—

### Special Topics in Psychology.

A summary of some of the chief points of psychology (sense-perception, attention, instinct, psycho-physical law, hypnotism, etc.), from the standpoint of modern experimental methods. Lectures, demonstrations, and experiments. The larger works of Ladd and James will afford collateral reading.—*Three hours a week, first semester.*

### English Psychology.

A historical sketch of its development from Locke, through Hume, Hartley, and the Mills, to Bain.—*Three hours a week, second semester.*

### Original Investigation in the Laboratory.

The work will be along three lines, physiological psychology, psycho-physics, and a study of the physical phenomena of the lower forms of life.—*Four hours a week, throughout the year.*

## C. ETHICS.

Professor DEWEY:—

### Political Philosophy.

A critical discussion of the development of the idea of the social organism, social statics, or the conditions of social order, involving a discussion of sovereignty, rights, and duties; and social dynamics, or the methods and principles of social progress.—*Three hours a week, first semester.*

### Supplementary Course in Political Philosophy.

A more detailed investigation of one or two topics discussed generally in the preceding course.

### Anthropological Ethics.

The origin and early development of moral ideas and customs; an attempt to discover the psychological and social conditions in which primitive morality has its basis.—*Two hours a week, second semester.*

### Seminary.

Historical investigation and critical discussion of typical problems.

The topics for 1893-94 were: the psychology of action in its ethical bearings as treated in English Ethics; the psychology of will in its relations to the theory of sovereignty; the conflict between theories basing morality upon natural law and those basing it upon institutional life.—*Three hours a week, throughout the year.*

Dr. LLOYD:—

History of British Ethics from Hobbes to Mill.

A study of the development of ethical ideas and problems in Great Britain. Special attention is given to the reflection of English political and industrial life in its ethical theory.—*Two hours a week, first semester.*

#### D. ÆSTHETICS AND PHILOSOPHY OF RELIGION.

Professor DEWEY:—

Æsthetics.

Historical development of its problems; its psychological basis.—*Two hours a week, first semester.*

Dr. LLOYD:—

Philosophy of Religion.

Lectures and assigned readings.—*Two hours a week, second semester.*

#### THE SCIENCE AND THE ART OF TEACHING.

Three courses constitute the foundation of the work in this department. Course one, four hours a week, for one semester, is a practical course, dealing with methods of instruction, general school-room practice, school hygiene, and school law. Course two, also four hours a week, for one semester, theoretical and critical, deals with the principles underlying teaching and government, as deduced from the facts of human nature, physical, mental, and moral, and the educational values or uses of studies. Course three, three hours a week, for one semester, devoted to school supervision, deals especially with the duties of superintendents and principals, including the arts of constructing courses of study and grading schools, and conducting examinations, teachers' meetings, institutes, etc. These courses are open to students seeking advanced degrees, and are sometimes pursued by them with interest and advantage. Such students are strongly advised to take course two, at least, if they have never studied the science of teaching, provided they intend to follow the art of teaching. As the three courses are strictly professional, lying wholly outside of the field of general study, there is manifest reason in recommending them to graduate students, although elementary.

Graduate students who have had this more elementary instruction,

should choose their work among the more advanced courses of the department, given below. These courses are supplemented by private reading done under the direction of the professor, as far as necessary. These more advanced courses may also be profitably pursued by students who have not done the elementary work, although some previous practical or theoretical acquaintance with that work is desirable. Students who do not intend to become practical teachers, but who elect work in this department for its culture value, are, as a rule, advised to make choice of educational history, or of that subject combined with the science of teaching. It may be added that, while the primary aim of the department is to assist students seeking to fit themselves for the work of teaching, the general culture value of the several courses is kept constantly in mind. Nothing need be said about the doctor's degree specially, except that private study will be assigned to the candidate according to the nature of the work.

Professor HINSDALE:—

History of Education: ancient and mediæval.

Recitations and lectures. Text-book: Compayré's History of Pedagogy. The subjects treated in the lectures given in this course are oriental, Greek, and Roman education, and the rise and early development of Christian schools.—*Three hours a week, first semester*

History of Education: modern.

Recitations and lectures. Text-book: Compayré's History of Pedagogy. The topics dealt with in this course of lectures are the movements of modern educational thought and practice.—*Three hours a week, second semester.*

The Comparative Study of Contemporary Educational Systems: domestic and foreign.

Besides a general survey of the institutional organization of education in the United States, similar surveys are made of several foreign countries, as Germany, Italy, France, and England. Lectures.—*Two hours a week, second semester.*

Seminary.

Study and discussion of special topics in the history and philosophy of education.—*Two hours a week, second semester.*

#### POLITICAL ECONOMY.

Undergraduate courses in political economy which are not here enumerated represent the work of at least one academic year. These courses cover "Elements of Political Economy" "History of Industrial Society," and "Problems in Political Economy."



Of the courses enumerated below, those designated as "Intermediate Courses" are open to undergraduate as well as to graduate students, but special instruction of one hour a week will be afforded all graduate students in connection with each course, this "extra hour" being devoted to a more careful analysis and a more extended discussion than is possible in the lectures. The courses designated as "Graduate Courses" are open only to graduate students, or to undergraduates making a specialty of political economy.

Professor ADAMS:—

### Principles of the Science of Finance.

Under the science of finance will be included a discussion of principles of public expenditure, budgetary legislation, financial administration, public industries, and public debts. Mr. DIXON will assist Professor ADAMS in this course.—*Intermediate course, two hours a week, second semester.*

### Transportation Problem.

This course traces the history of transportation as an industry, shows the social, industrial, and political results of modern methods of transportation, presents an analysis of the railway problem, and discusses the various solutions proposed.—*Intermediate course, two hours a week, second semester.* An "extra hour" is given in connection with this course under the direction of Mr. COOLEY.

### Critical Analysis of Economic Thought.

In this course, as in the one following, it is the design to acquaint the student with the latest phase of economic development. Acquaintance with the principles of political economy by John Stuart Mill is assumed, and the discussions respecting economic theory since 1850 are subject to critical analysis.—*Graduate course, one hour a week, first semester.*

### Critical Examination of the Labor Problem and the Monopoly Problem.

In this course acquaintance with the theories of socialism and with the lines of discussion on all practical economic problems is assumed, and the question as to the probable outcome of labor agitations, or political agitations traced to the existence of industrial monopolies, and of the effect of these agitations on the further development of economic theory, is subjected to discussion.—*Graduate course, one hour a week, second semester.*

### Seminary in Finance; and Seminary in Economics.

It is the purpose of these courses, which may be regarded as a

single course, to give students an opportunity of acquainting themselves with proper methods of investigation. The subject of these seminars will be varied from year to year according to the needs of the students; and it may be proper to add, that the "extra hours" given in connection with "History and Theory of Money and Banking" and with "History of Political Economy," are conducted according to seminary methods.—*Graduate course, twice a week, throughout the year.*

Professor TAYLOR:—

### Land Problems Historically and Theoretically Considered.

In this course will be treated the evolution of landed property, agrarian movements in all ages, land nationalization, the history of tenures, land-transfer, peasant proprietorship, and the farmer question in the United States.—*Intermediate course, two hours a week, first semester.*

### Socialism.

This course is in a measure complementary to the preceding. As that course is devoted largely to the consideration of the various plans for redistributing the unearned surplus of land values, so this course treats of schemes for distributing the other industrial surpluses, interest, and profits. It will include the study of communism, socialism proper, state socialism, and socialistic legislation generally.—*Intermediate course, two hours a week, second semester.*

### History and Theory of Money and Banking.

In this course, while stress will be laid on the *theory* of money, special effort will be made to secure a thorough understanding of *current monetary problems* in the United States. An extra hour for conference and reports on reading will be given to graduate students desiring it.—*Intermediate course, two hours a week, first semester.*

### Industrial History of the the United States.

This course is intended to bring out the facts of the growth of agriculture, manufacture, and commerce in the United States, and seek an explanation of the causes at work. It will include a history of corporations and trusts, as also a history of strikes and labor movements generally.—*Intermediate course, two hours a week, first semester.*

### Social Philosophy with special reference to Economic Problems.

The purpose of this course is to consider the chief concepts and principles which lie at the foundation of economic society. It will consider the various doctrines as to the essential nature of society (mechanism, organism, etc.), the different social ideas (utilitarianism,

laissez-faire, etc.), the nature and limits of the property right, the ideal principle of distribution, the family as a factor in economic society, etc.—*Graduate course, one hour a week, second semester.*

### History of Political Economy.

This course consists of assigned readings in political economy in connection with a study of Ingram's History of Political Economy. It is especially designed for candidates for advanced degrees who are preparing for final examination.

Mr. C. H. COOLEY:—

### Theory of Statistics.

The earlier part of this course consists of lectures. Later, practical exercises are introduced, and during the second semester the student is expected to undertake work having in some measure the character of independent research.—*Intermediate course, one hour a week, throughout the year.*

### Special Studies in Statistics.

*Intermediate course, two hours a week, second semester.*

Mr. DIXON:—

### History of the Tariff in the United States.

*Intermediate course, two hours a week, second semester.*

All Instructors in the Departments of Economics and History:—

### Current Economic Legislation and Literature.

It is the custom of all graduate students of economics and history to come together one evening each week for the purpose of reporting upon current economic legislation and literature, and freely discussing all topics pertaining to economy which may be of general interest.

## INTERNATIONAL LAW.

The courses in international law presuppose a general acquaintance with modern European history.

President ANGELL:—

### Lectures on International Law.

*Two hours a week, first semester.*

### History of Treaties.

*Two hours a week, second semester.*

## MUSIC.

Courses are given in the University, but not here enumerated, that pro

vide instruction in the science and practice of choral music, the science of harmony, and simple and double counterpoint. The courses named below are intended for graduate students.

Professor STANLEY:—

Canon and Fugue.

*Two hours a week, throughout the year.*

Musical Form.

*Two hours a week, throughout the year.*

Free Composition.

*Two hours a week, throughout the year.*

Instrumentation.

*Two hours a week, throughout the year.*

Original work in research will be required of candidates for a Doctor's degree, who take Music as one of their subjects.

### MATHEMATICS.

The courses mentioned below presuppose the usual preparatory course in algebra and elementary geometry, plane, solid, and spherical, together with two years of collegiate study devoted to trigonometry, higher algebra, plane analytic geometry, and differential and integral calculus.

#### A. PRIMARILY FOR GRADUATES.

Professor BEMAN:—

Solid Analytic Geometry.

Frost, with references to Salmon.—*Two hours a week, second semester.*

Differential Equations.

Forsyth, with references to Johnson, Boole, and Mansion.—*Three hours a week, first semester; two hours a week, second semester.*

Mathematical Reading.

This course is designed to give graduate students an opportunity to read standard mathematical works under the direction of the faculty. Jordan's *Cours d'Analyse* was read in 1893-94.—*Three hours a week, throughout the year.*

Assistant Professor COLE:—

Theory of Complex Numbers.

This course leads to the theory of the elliptic and other transcendental functions. Its subject matter is the logical development of the conception of the complex (imaginary) quantities, and the con-

sideration of the properties of functions of a complex variable.—*Three hours a week, first semester; two hours a week, second semester.*

Assistant Professor ZIWET:—

Advanced Mechanics.

This course is designed for students who have taken a preliminary course in mechanics involving the elementary applications of the calculus. The first part of the course is mainly devoted to the theory of the potential and its applications; the second to rigid dynamics.—*Two hours a week, first semester; three hours a week, second semester.*

#### B. FOR GRADUATES AND UNDERGRADUATES.

Professor BEMAN:—

Solid Analytic Geometry.

Frost, with references to Salmon.—*Two hours a week, first semester.*

Quaternions.

Hardy, with references to Tait and Hamilton.—*Three hours a week, second semester.*

Teachers' Seminary.

Critical study of certain text-books in algebra and geometry, together with the discussion of methods and aims in mathematical teaching, sketches of the history of mathematics, lists of books for teachers, etc.—*Two hours a week, throughout the year.*

Assistant Professor COLE:—

Projective Geometry.

This course is devoted to a systematic treatment of the elements of modern coördinate geometry as a basis for the theory of higher curves and of surfaces on the one hand, and of invariants on the other.—*Three hours a week, throughout the year.*

Dr. MARKLEY:—

Modern Higher Algebra.

This course is based on Burnside and Panton's Theory of Equations.—*Three hours a week, second semester.*

Fourier's Series, and Spherical, Cylindrical, and Ellipsoidal Harmonics.

This course is based on Byerly's treatise.—*Two hours a week, throughout the year.*

## PHYSICS AND ELECTRICAL ENGINEERING.

The courses here announced presuppose about one and a half years' collegiate work in physics; viz., a course in mechanics, sound, light, electricity, magnetism, and heat, five hours a week, for one year; a beginners' course in laboratory work, two or three hours a week for half a year; and a course in primary and secondary batteries, two hours a week for half a year.

The courses in Electricity and Magnetism (Mascart and Joubert), the Theory of Light (Preston), and the Theory of Heat (Preston), are primarily for graduates; the other courses are open to undergraduates, but they are found to be beyond the work done in many colleges.

Graduate students, who are properly qualified by their previous training, have opportunity for original research in the physical laboratory under the immediate supervision of the director and his associates.

Professor CARHART:—

Dynamo Electric Machinery.

*Three hours a week, second semester.*

The Alternate Current Transformer: Fleming.

*Two hours a week, first semester.*

The Theory of Heat: Preston.

*Three hours a week, first semester.*

Professor CARHART, Assistant Professor PATTERSON, and  
Dr. GUTHE:—

Electrical Units and Measurements.

*Lectures, two hours a week, laboratory work, three times a week, first semester.*

Assistant Professor PATTERSON:—

Mathematical Electricity: Emtage.

*Three hours a week, second semester.*

Electricity and Magnetism: Mascart and Joubert.

*Two hours a week, first semester.*

Advanced Work in Photometry.

*One(or two)hours a week, second semester.*

Mr. REED:—

Theory of Light: Preston.

*Lectures and recitations, two hours a week, laboratory work, twice a week, second semester.*

Dr. GUTHE:—

Advanced Laboratory Work in Electricity and Magnetism.

*Twice a week, second semester.*

### GENERAL CHEMISTRY.

The courses here announced presuppose about two years' collegiate study of general, analytical, and organic chemistry, comprising both theoretical instruction and laboratory practice. The laboratory research courses are intended primarily for graduate students. The lecture courses are for graduates and advanced undergraduates, but graduates taking these courses will receive additional special instruction of one hour a week. Students taking general chemistry as a major study are required to have a reading knowledge of German and French.

Professor FREER:—

Theoretical Chemistry of Recent Years.

Lectures, readings, and laboratory work in the methods of determining molecular weights. Lectures, *two hours a week*, laboratory work, *one hour a week, first semester.*

German Chemical Literature; Journal Club.

The Journal Club will be under the direction of Professor FREER, but all the instructors in the department of general chemistry will take part therein—*Two hours a week, second semester.*

Laboratory Research.

The work may be in organic or in inorganic general chemistry. Students taking organic work must have a good knowledge of organic preparations.—*Hours arranged with instructor, throughout the year.*

Mr. HIGLEY:—

The Rarer Chemical Elements.

Lectures and laboratory work in inorganic preparations. Lectures, *two hours a week*, laboratory work, *one hour a week, second semester.*

Laboratory Research in Selected Topics in Inorganic General Chemistry.

*Hours arranged with instructor, throughout the year.*

Mr. LICHTY:—

Laboratory Work.

Methods of determining molecular weights, and other problems involving the specific gravity of gases.—*Three hours a week, second semester.*

### Laboratory Research.

Involving the methods employed in the preceding course.—*Hours arranged with instructor, second semester.*

### ORGANIC CHEMISTRY AND ANALYTICAL CAEMISTRY.

The necessary preparation for the several graduate courses in these subjects is stated separately for each course below. For full graduate studies in analytical or organic chemistry each application is judged upon its individual merits, in view of the nature of the studies desired and the collateral qualifications of the applicant. In every case the student must have made himself competent for trustworthy determinations in the laboratory, and should have begun to use chemical literature in its original sources. The undergraduate work in these subjects in this University embraces fifteen courses, omitted from this announcement, amounting to sixty-one hours of credit, in addition to the courses in general chemistry and in physiological chemistry.\* From twenty-one to forty-two hours of credit in chemistry, general, analytical, and organic, if the work be well directed to the end in view, may be made to suffice, according to the aims of the student, to prepare him for graduate studies in organic and analytical chemistry. Graduates of other colleges who have carried chemical studies with laboratory work through two years are in many cases found prepared to take up graduate courses here at once. Candidates for a higher degree who take chemistry as a major study are expected to engage in original studies, both in the laboratory and in the library. Any student can do creditable work in a research, under direction, if he have sufficient preparation and exercise faithful industry. In the research courses it is usually made a part of the student's work to prepare his report in literary form adapted for publication in a chemical periodical. In laboratory work, hours can be arranged between 8 A. M. and 6 P. M.

Professor PRESCOTT:—

#### Organic Synthesis and Ultimate Analysis.

Open to those who are prepared in general chemistry, primary organic chemistry, qualitative and quantitative analysis, and the initial organic preparations. Laboratory work, with reading by subjects in the library. The laboratory work may be taken mainly in synthetic preparations or mainly in organic combustions. If mainly in the combustion work, it may well be accompanied by molecular weight determinations in the laboratory of general chemistry. If mainly in

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\*Details in regard to the undergraduate courses are given in the University Calendar for 1893-94, pages 79 to 82. An "hour of credit" implies the satisfactory completion of work equivalent to one exercise a week during one semester.



synthesis, it is accompanied by the indexing of chemical literature in the library, following well defined lines of synthetic production, with reports, in a seminary class, upon both literature and experimentation. The synthetic studies especially lead to original research, and are continued as such in another year's course.—*Hours arranged with instructor, throughout the year.*

### Analytical Organic Chemistry.

Open to those who are prepared in general chemistry, qualitative and quantitative analysis, primary organic chemistry, and proximate organic analysis equivalent to undergraduate course 14. Laboratory work with research in the library. Qualitative and quantitative work with the alkaloids, the fats, the recovery of poisons, and methods of chemical estimation of the purity of waters. In the determination of organic compounds chemical methods are mostly employed, but these are conjoined with optical methods by use of the polariscope, spectroscope, and refractometer, as well as by microscopic examinations. The student elects some one branch of the work provided for in this course, as, for instance, the alkaloids, and devotes himself to experimentation in this branch and to its bibliography, reporting his progress from time to time in the seminary. Before the close of the course the work becomes original investigation.—*Hours arranged with instructor, throughout the year.*

### Investigations in Organic Chemistry.

The general chemical preparation for research is that required for one of the two courses above named. Besides this, some special preparation, such as can be obtained in one of the above named courses, is usually necessary. Critical bibliography is classed as research, but it must be accompanied by laboratory investigation unless the student has experience in the latter. Any subject in organic chemistry, synthetic or analytic in its aim, and within the range of inquiry in this laboratory, may be agreed upon. The constitution of the compounds of the alkaloids is under investigation at present. The student is expected to gather from chemical literature the substance of a full history of his subject, usually preparing some form of bibliography. In the seminary class the student reports his results and his plans, from time to time, when there is a critical discussion of his report.—*Hours arranged with instructor, throughout the year.*

Professor JOHNSON:—

### Qualitative Analytical Chemistry.

Open to those well prepared in qualitative analysis, and in a beginning course in qualitative analysis, in addition to a course in general

chemistry. The applicant must be able to pass examination in courses 1 and 4 of the undergraduate studies, or their equivalent. The work consists in an advanced study of qualitative methods and reactions, with a search of the original literature. Lectures, *two hours a week*, laboratory work, *hours arranged with instructor, second semester.*

### Investigations in Inorganic Reactions and Qualitative Methods.

Open to those who have completed the course last named, or, being prepared to enter that course, have also such special preparation as the desired research demands. The subject of a student's research may be selected in any range of inorganic reactions, such as studies of oxidation and reduction, comparative methods of separation, limits of qualitative recovery, and the composition of products in analysis. The facts of oxidation, in its successive degrees, are especially under experimental inquiry.—*Hours arranged with instructor, either first or second semester, or, preferably, both semesters.*

### Professor CAMPBELL:—

#### Quantitative Analytical Chemistry.

Open to those well prepared in qualitative analysis, who have had the beginning course in quantitative work, equivalent to course 4 of undergraduate studies, in addition to a study of general chemistry. Laboratory work and library reading. The work consists of general advanced quantitative analysis with specialization in the direction of the aims of the student.—*Hours arranged with instructor, first or second semester, or both semesters.*

#### Investigations in Metallurgical Chemistry and Quantitative Methods.

Open to those who have completed the course last named, or have had an equal amount of training which should be applicable to the research desired. The undergraduate courses 6 and 7 are advantageous in preparation for this research. The subject of the research may be taken from any part of quantitative work, to fill out deficiencies in analytical science. Work has been done for the improvement of methods for the analysis of several metals of manufacture. It is the special undertaking in this laboratory to make advances in the proximate analysis of iron and steel, and other metals, that is, to determine the actual chemical union of the elements existing in metals as manufactured. This has been undertaken for carbon in iron and steel, the research having for its object the determination, if possible, of the form or forms in which the carbon occurs, and the influence of the

several forms upon the physical properties of the metal. The work is conducted, first, by chemical study of the solid carbon derivatives; second, by microscopic study of the structure as varied by heat-treatment; and third, by chemical study of gaseous products of solution. Critical bibliography is carried along with laboratory determinations, as means of research.—*Hours arranged with instructor, throughout the year.*

### HYGIENE AND PHYSIOLOGICAL CHEMISTRY.

The courses here announced presuppose that the student taking them is prepared for original research.

Professor VAUGHAN:—

Original Research on the Causation of Disease.

*Hours arranged with instructor, either first or second semester.*

Professor NOVY:—

Advanced Physiological Chemistry.

Laboratory work and reading.—*Hours arranged with instructor, either first or second semester.*

### ASTRONOMY.

The courses here announced presuppose acquaintance with general, spherical, and practical astronomy and observatory practice.

Professor HALL:—

Theoretical Astronomy.

Computation of orbits, correction of approximate elements, and theory of special perturbations.—*Five hours a week, throughout the year.*

Mathematical Theory of Planetary Motion.

Elementary treatment of general perturbations.—*Two hours a week, first semester.*

Professor HALL and Mr. TOWNLEY:—

Extended Practical Course in the Use of Instruments.

*Hours (at the observatory) arranged with instructors, first semester.*

Mr. TOWNLEY:—

Method of Least Squares and Empirical Curves.

*Three hours a week, throughout the year.*

Spherical Astronomy.

*Three hours a week, throughout the year.*

## MINERALOGY.

The higher work in mineralogy presupposes an elementary knowledge of chemistry and an introductory course in mineralogy, combining theoretical instruction with practice in determining minerals. The work will be directed by Professor PETTEE.

## GEOLOGY.

The course of instruction in geology for undergraduates, as announced in the University Calendar for 1893-94, page 84, embraces two years. The first year is devoted to elementary studies in physical geology and historical geology, giving three hours a week to each for one semester. Le Conte's Elements of Geology is used, supplemented by lectures and exhibitions of specimens, maps, etc. During the second year more detailed instruction is given, two hours each week, in the same general subjects. Green's Physical Geology is used for reference during the first semester, supplemented by lectures and laboratory work. Each student is given a special subject for investigation in connection with which a thesis of about 2500 words are required. During the second semester palæontological studies are carried on with the aid of various treatises and laboratory work. A special subject is assigned each student and a short thesis is required.

Students in the graduate school may enter either of the advanced courses mentioned above, providing studies equivalent to the elementary course have been pursued. Those who have done more work than is represented by the elementary course may make special arrangements for instruction and assistance in various lines of study, dependent on their tastes and acquirements. In a general course the current literature of geology will be read with special reference to Pleistocene geology, and to the origin and classification of topographic forms, glacial records, lake histories, erosion, and all of the processes by which the surface of the earth has come to have its present form.

The geological museum is being rearranged and a series of fossils selected to illustrate the life history of North America. This collection is intended especially for the use of students in the elementary courses, but may be consulted by advanced students as well. The specimens will be exhibited in the lecture room as required, and after lectures will be returned to the cases in the museum where they will be available for examination at any time.

There is a second collection embracing some ten thousand specimens of both American and European fossils, which is arranged zoölogically and intended for the use of advanced students in palæontology. Special collections of rocks, brachiopods, corals, etc., numbering from one

hundred and fifty to two hundred specimens each are arranged in the geological laboratory for the immediate use of students.

The collection in physical geology is small, but efforts are being made for its enlargement, and ample material will be on hand to illustrate lectures in this department. Students bringing private collections will be given an opportunity to arrange them in cases provided for the purpose, and facilities for consulting original monographs, and making comparison with specimens in the museum.

The geological laboratory is provided with apparatus for preparing thin sections of fossils and rocks, and with microscopes and photographic instruments. The laboratory is open to students from nine until five each day throughout the collegiate year.

The work in geology will be conducted by, or under the direction of, Professor RUSSELL.

### SYSTEMATIC ZOÖLOGY.

The courses here announced presuppose about one year's collegiate study of systematic zoölogy, both vertebrate and invertebrate, and a course combining lectures and laboratory practice in the identification of vertebrates.

Professor STEERE:—

Systematic Study of Vertebrates.

*Hours arranged with instructor, either first or second semester.*

Special Study of Invertebrate Groups.

*Hours arranged with instructor, first semester.*

Development of Species and Theory of Classification.

*Two hours a week, first semester.*

### ANIMAL MORPHOLOGY.\*

The courses here announced presuppose a year's work in general biology, such as is carried on in this University conjointly by the departments of botany and animal morphology. Following the general biology, work is provided in both invertebrate and vertebrate morphology. Candidates for the higher degrees will usually pursue both lines of work, but will find it of advantage to specialize in one of them; they will also be

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\*Professor REIGHARD has leave of absence for the year 1894-95. As far as possible the work of candidates for higher degrees will be arranged by him before his departure. Those who expect to do research work during 1894-95 should consult Professor REIGHARD as early as June 15th, 1894, in order that the subject of the research, its scope, and the methods to be employed may be decided upon. During his absence the work in animal morphology will be directed by Mr. WORCESTER with the co-operation of Assistant Professor HUBER and other competent instructors. It is expected that Mr. KOFORD will have charge of a part of the work.

required to have a knowledge of the elements of physics and chemistry and some acquaintance with French and German.

In the laboratory, a description of which is given in the University Calendar for 1893-94, page 29, the student learns methods of dissection, staining, imbedding, section-cutting, graphic and solid reconstruction, and other technical methods of investigation. A library, shelved in the laboratory, contains sets of the important English and foreign periodicals, as well as many monographs, and other separate publications. It contains also an extensive collection of original papers relating to the invertebrate fauna of our fresh waters. The private collections of the instructors in morphology and the library of the Department of Medicine and Surgery, which is rich in the literature of vertebrates, are also accessible to students. The original papers in connection with both lectures and laboratory work are placed in the hands of students, and special reading is required.

Graduate students will often find the elementary work in general biology of value to them, and they can rarely omit, without loss, any of the courses in animal morphology that are open to undergraduates.

A student who selects animal morphology as a *minor* for the *master's degree* may pursue the course in invertebrate morphology, vertebrate comparative anatomy, vertebrate embryology, or histology, but should not attempt to do work in more than one of these subjects. If animal morphology be chosen as a *major*, work may be taken in invertebrate morphology and at the same time in any two of the branches of vertebrate morphology named above. For any of these branches the student may substitute the preparation of a thesis, and such substitution is advised for those who do not intend to become candidates for the doctor's degree.

The work outlined for those who elect animal morphology as a *major* for the master's degree is suitable for candidates for the *doctor's degree* who elect this subject as a *minor*.

Those electing animal morphology as a *major* for the *doctor's degree* are expected to complete all the courses offered. During the first part of his term of residence at the University, the candidate should devote his time to these courses and to the completion of work on the minors. In his second year of residence, in addition to completing the work mentioned, he is expected to repeat a designated piece of research work in order to acquaint himself with methods of investigation. At the same time he does assigned reading on the more important problems of morphology and on zoölogical history and theory. At the least one year must be devoted to the research which is to be embodied in the doctor's dissertation.

To *graduates* who have taken as undergraduates any of the courses

specified above or their equivalent, is assigned a corresponding amount of work in reading and in the preparation of a thesis.

Those electing animal morphology as a major, will find it of advantage to select as one minor either botany, physiology, systematic zoölogy, palæontology, or physiological psychology. Less closely related is work in bacteriology, physiological and organic chemistry, and geology.

#### A. PRIMARILY FOR GRADUATES.

Mr. WORCESTER:—

##### Current Literature of Animal Morphology.

The instructors and advanced students hold weekly meetings at which reports are made on important current papers, followed by informal discussion. Although the meetings are open to all, the membership is restricted.—*One hour a week, throughout the year.*

Original Work in Animal Morphology: invertebrate morphology, and vertebrate comparative anatomy, embryology, and histology.

Definite problems are assigned and worked out under the constant supervision of the instructors. The locality affords exceptional advantages for work on vertebrate embryology (Petromyzon, several Teleosts, Amia, Acipenser, Amblystoma, and other forms are under control) and for faunistic or experimental studies on invertebrates. Students intending to begin this work should confer with the professor in charge\* as early as the preceding spring in order that they may have time in which to prepare necessary material.—*Hours arranged with instructors, throughout the year.*

Assistant Professor HUBER:—

##### Microscopic Anatomy of the Brain and Special Sense Organs.

This course presupposes a knowledge of mammalian (or human) anatomy, including dissection. It must be preceded or accompanied by a course in microscopic technique. Work in vertebrate embryology, though not indispensable, is advised.—*Five hours a week, first or second semester.*

##### Original Work in Animal Morphology.

See above.

Mr. ———:—

##### Original Work in Animal Morphology.

See above.

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\*See foot-note on page 41.

## B. FOR GRADUATES AND UNDERGRADUATES.

Mr. WORCESTER:—

## Invertebrate Morphology.

The lectures treat of the comparative anatomy and ontogeny of invertebrates. The laboratory work includes a series of forms which supplements that studied in the course in general biology. Students are required to prepare and deliver lectures on assigned topics.—*Three hours a week, throughout the year.*

Mr. ———: \*—

## The Comparative Embryology and Anatomy of Vertebrates.

The work in embryology, which precedes the anatomy, begins with a study of the early stages of fishes and amphibia and concludes with detailed work on the chick and the rabbit. In anatomy a few type forms are dissected and preparations of other forms are studied. The lectures are illustrated by charts and preparations especially designed for the purposes of this course.—*Five hours a week, throughout the year.*

This work may be advantageously preceded by the undergraduate courses in mammalian anatomy and histology (courses 4, 5, 6, and 7, University Calendar for 1893-94, pages 86 and 87), though these courses are not required.

## The Animal Egg:

A course of about fifteen lectures on the maturation, fecundation, and cleavage of the animal egg, with a discussion of the theory of isotropy and the mosaic theory. The conclusions of *experimental embryology* will be discussed, and qualified students may, by special permission, undertake individual laboratory work on this subject.—*One hour a week, second semester.*

Mr. LEWIS: †—

## Mammalian Anatomy.

Dissection of the cat, with class-meetings twice a week for quizzes on the anatomy of the cat and for such lectures as may be necessary. It is the purpose of the course to afford a training in mammalian anatomy which shall be substantially equivalent to the training which the medical student receives in human anatomy. This training gives that mastery of anatomical facts and that knowledge of anatomical technique, which are believed to furnish the most satisfactory basis for

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\*See foot note on page 41.

†Mr. LEWIS holds the appointment of Assistant in Vertebrate Morphology for the year 1894-95.



the study of human or comparative anatomy. The class makes use of type-written copies of a descriptive anatomy of the cat prepared by Professor REIGHARD.—*Five times a week, throughout the year.*

### BOTANY.

Graduate and undergraduate students who have taken a full year's work in general biology or the corresponding elementary courses in botany are offered the advanced and special courses named below. All of these require practical laboratory work and use of the reference library.

Professor SPALDING:—

#### Morphology of the Higher Plants.

Lectures will be given and subjects assigned for investigation and reports.—*Three hours a week, first semester.*

#### Principles of Classification.

*Three hours a week, second semester.*

Assistant Professor NEWCOMBE:—

#### Vegetable Histology.

Studies will be made of the developmental history of chromatophores, the phenomena of karyokinesis and fertilization, and other subjects involving the application of modern histological methods.—*Five hours a week, first semester.*

#### Comparative Anatomy and Physiology of Phanerogams.

*Five hours a week, second semester.*

Mr. JOHNSON:—

#### Cryptogamic Botany.

A study of fresh water and marine algæ.—*Five hours a week, first semester.*

#### Cryptogamic Botany.

A study of fungi. Instruction will be given in culture methods and collections will be made.—*Five hours a week, second semester.*

Students who are prepared for original research will have special problems given them by

Professor SPALDING, in Morphology and Classification;

Assistant Professor NEWCOMBE, in Physiology;

Mr. JOHNSON, in Cryptogamic Botany.

### PHYSIOLOGY.

The advanced work in physiology presupposes a knowledge of mammalian anatomy, including histology, and the elements of physics and

chemistry. The required training is to be got from such courses as 4 and 5 in animal morphology (or courses in descriptive human anatomy and practical anatomy), 1 and 2 in physics, 1, 2, and 4 in general chemistry, and 10 in organic chemistry (described in the University Calendar for 1893-94, pages 76 to 87). Ability to read German is indispensable, and French is desirable, for students taking physiology as a major study for an advanced degree, though in some cases a candidate may be considered qualified to begin his advanced work prior to the completion of these requirements.

**Professor LOMBARD:—**

**Lectures and Recitations.**

*Five hours a week, throughout the year.*

**Laboratory Course.**

*Three times a week for one-third of a semester.*

**Physiological Experimentation.**

*One hour a week for one semester.*

**Physiological Research and Collateral Reading.**

Arranged to meet the wants of students who take physiology as a major study.

**ENGINEERING.**

Nearly all the instruction provided in the engineering department consists of courses that are required for the undergraduate degree; but the following courses offer an opportunity for graduates to do research work for a second degree. In marine engineering the instruction will comprise a study of marine steam engines and propelling instruments, the hydraulics of ship-building, details of construction, propulsion by sails and steam engines, and other topics. The courses in electrical engineering are included with physics (page 34). In each case the graduate will receive special advanced instruction suited to his individual needs, and the hours and the amount of work will be arranged with the respective instructors as may seem best.

**Professor COOLEY:—**

**Machinery and Mill Work: advanced course.**

A study of the installation of plants of machinery with comparison of the results obtained in practice from different systems.

**Naval Architecture.**

**Marine Engines.**

**Ship-Building.**

**Professor COOLEY and Assistant Professor WAGNER:—**

**Experimental Laboratory Work: advanced course.**

Measurements of power and efficiency of secondary machines.

**Steam Engineering: advanced course.**

Devoted largely to testing steam machinery and reporting on the tests.

**Assistant Professor WAGNER:—**

**Thermodynamics: advanced course.**

Hot air and gas engines; air compressors and refrigerating machines. The work consists largely in a comparison of experimental data with the deductions derived from theory.

# Catalogue of Students in 1893-94.\*

## RESIDENT GRADUATES.

| NAME.                                                                                                                                                        | RESIDENCE.                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| *Elmer Louis Allor, B.S., 1892,<br>Theoretical Astronomy; Political Economy; Constitutional History.                                                         | <i>Mt. Clemens.</i>          |
| Warren Babcock, Jr., B.S., <i>Mich. Agr. Coll.</i> , 1890,                                                                                                   | <i>Agricultural College.</i> |
| Warren Dwight Baker, A.B., 1893,<br>Latin; Greek; Roman Antiquities.                                                                                         | <i>Buchanan.</i>             |
| Grant S. Barber, B.S., 1891,                                                                                                                                 | <i>Champion.</i>             |
| Flora Gale Barnes, Ph.B., <i>Albion College</i> , 1890,<br>English Literature; French; Anglo-Saxon.                                                          | <i>Kalamazoo.</i>            |
| Elmer Ellsworth Bartlett, B.S., <i>Iowa College</i> , 1887,<br>European History; American History; English Literature.                                       | <i>Cedar Falls, Ia.</i>      |
| Jessie Irene Beal, B.S., <i>Mich. Agr. Coll.</i> , 1890,                                                                                                     | <i>Agricultural College.</i> |
| Lyman James Briggs, B.S., <i>Mich. Agr. Coll.</i> , 1893,<br>Physics; Mathematics; Mechanics.                                                                | <i>Lacey.</i>                |
| Kennedy Brooks, A.B., <i>Univ. of Wooster</i> , 1878,<br>A.M., <i>Univ. of Wooster</i> , 1881,<br>Political Economy; American History; Political Philosophy. | <i>Springfield, Ill.</i>     |
| * Harry Conant Bulkley, A.B., 1892,<br>Political Economy; American History; European Constitutional History.                                                 | <i>Monroe.</i>               |
| Alton Cyrel Burnham, B.S., <i>Mich. Agr. Coll.</i> , 1893,<br>Mathematics; Physics; Mechanical Engineering.                                                  | <i>Russell.</i>              |
| Benjamin Chapman Burt, A.B., 1875, A.M., 1879,<br>History of Philosophy; History of Education; English Drama.                                                | <i>Ann Arbor.</i>            |
| *† George Jason Cadwell, Ph.B., 1894,<br>Political Economy; Comparative Administrative Law; Science of Jurisprudence.                                        | <i>Chicago, Ill.</i>         |
| Elizabeth Alma Campbell, Ph.B., 1891,<br>Æsthetics; Roman Archæology; Music.                                                                                 | <i>Ann Arbor.</i>            |

\* The principal subjects of study pursued by candidates for an advanced degree are indicated under their respective names.

An asterisk (\*) before a student's name indicates that the student is also pursuing studies in the Department of Medicine and Surgery or in the Department of Law.

A dagger (†) indicates that the student was admitted to the Graduate School at the beginning of the second semester, on completion of the requirements for the bachelor's degree indicated in each case, though the degree will not be actually conferred until the end of the year.

- William Aulls Campbell, M.D., 1882, B.S., 1893, *Ann Arbor*.  
Vertebrate Morphology; Invertebrate Morphology; Physiology.
- Howard Burt Cannon, B.S., *Mich. Agr. Coll.*, 1888, *Ann Arbor*.  
Political Economy; Economic History; Comparative Constitutional Law.
- Lewis Clinton Carson, A.B., 1892, A.B., *Harvard University*, 1893, *Detroit*.  
Physiological Psychology; Physiology; History of Philosophy.
- Henry Northrup Castle, A.B., *Oberlin Coll.*, 1883, *Honolulu, H. I.*  
Philosophy; Political Economy; German Literature.
- Albert Loring Clark, B.S., 1893, *Ann Arbor*.
- Ida May Clendenin, B.S., *University of Missouri*, 1886, M.S., 1893, *Mexico, Mo.*
- Benjamin Cluff, Jr., B.S., 1890, *Provo City, Utah*.  
Pedagogy; Mathematics; Philosophy.
- Edwin Raymond Cole, B.S., 1892, *Watrousville*.  
Physics; Mathematics; Music.
- Charles Horton Cooley, A.B., 1887, *Ann Arbor*.  
Political Economy; Sociology; Statistics.
- Charles Cottingham, B.C.E., *Purdue Univ.*, 1892, *Independence, Ia.*  
Civil Engineering.
- \* Arthur Howe Covert, A.B., 1893, *Ann Arbor*.  
Comparative Constitutional Law; Comparative Administrative Law; Finance.
- Mabel Crabbe, B.L., 1893, *Chicago, Ill.*  
English Literature; History; German.
- John Patterson Davis, A.M., 1893, *Omaha, Neb.*  
Political Economy; Constitutional Law; Administrative Law.
- Walter Dennison, A.B., 1893, *Ann Arbor*.  
Latin; Greek; Classical Archæology.
- Tobias Diekhoff, A.B., 1893, *Ann Arbor*.  
German; Gothic; English.
- Frank Haigh Dixon, Ph.B., 1892, *Ann Arbor*.  
Political Economy; Finance; American History.
- Clinton Emerson Dolbear, A.M.B., *Tufts Coll.*, 1892, *Tufts College, Mass.*  
General Chemistry; Physics; Organic Chemistry.
- Fay N. Donaldson, A.B., *Napa College*, 1893, *Pontiac*.  
Hellenistic Greek; Ethics; Semitic Languages.
- Elsa Millicent Dopp, B.L., 1893, *Towne, Wis.*  
History; Philosophy; Political Economy.
- Genevieve Katharine Duffy, A.B., 1893, *Ann Arbor*.  
Greek; Philosophy; English Literature.
- Virginia Davis Farmer, Ph.B., 1892, *Chattanooga, Tenn.*  
English Literature; History of Philosophy; Æsthetics.
- † Ella Virginia Fitch, A.B., 1894, *Joliet, Ill.*  
Latin; Greek; German.
- Winifred Frusher, Ph.B., *Oberlin College*, 1893, *Perrysburg, O.*  
German; French; Pedagogy.

- Moses Gomberg, B.S., 1890, M.S., 1892,  
Organic Chemistry; Physiology; Histology. *Ann Arbor.*
- James C. Graves, B.S., *Albion College*, 1893,  
Organic Chemistry; Analytical Chemistry; Mineralogy. *Albion.*
- \* Humphrey Snell Gray, A.B., 1893,  
Constitutional Law; Political Economy; History. *Ludington.*
- Abram Sager Hall, Ph.B., 1876, Ph.M., 1877,  
Ph.D., 1878, *Ann Arbor.*
- Walter John Hammill, B.L., 1893,  
Political Economy; History; Pedagogy. *Rockford, Ill.*
- Carrie Rosepha Heaton, B.L., 1892,  
American Literature; American History; Ethics. *Charlotte.*
- Wilber Olin Hedrick, B.S., *Mich. Agr. Coll.*, 1891, *Agricultural College.*  
Political Economy; English Literature; History.
- Gilbert Henry Hicks, B.S., *Mich. Agr. Coll.*, 1892, *Agricultural College.*  
Botany; Bacteriology; Animal Morphology.
- Theodore Henry Hinchman, A.B., 1891, B.S., 1893, *Detroit.*  
Mechanical Engineering.
- Ellen-Clara Hogeboom, B.S., 1877, *Saginaw, West Side.*
- William Cephas Housel, A.B., *Univ. of Col.*, 1889, *Boulder, Col.*  
Political Economy; Finance; English Literature.
- John Black Johnston, Ph.B., 1893, *Ann Arbor.*  
Animal Morphology; Physiology; Physiological Psychology.
- Fred Lockwood Keeler, B.S., 1893, *Grass Lake.*  
Electrical Engineering.
- Ceylon Samuel Kingston, A.B., *St. Lawrence University*, 1892, *Canton, N. Y.*  
Psychology; American Literature; Pedagogy.
- Louis Klingel, B.L., *University of Illinois*, 1893, *Mascoutah, Ill.*
- † Adoniram Judson Ladd, A.B., 1894, *Ann Arbor.*  
English Literature; Pedagogy; Rhetoric.
- Anne Mae Lutz, B.S., 1893, *LaFayette, Ind.*  
Vertebrate Morphology; Invertebrate Morphology; English Literature.
- Elmer Adelbert Lyman, A.B., 1886, *Ann Arbor.*  
Mathematics; Mechanics; Astronomy.
- James Eugene Manchester, B.S., *Univ. of Minn.*, 1884, *Ann Arbor.*  
Mathematics; Astronomy; Physics.
- Frank Addison Manny, A.B., 1893, *Ann Arbor.*  
American Literature; European History; Rhetoric.
- \* David Porter Mayhew, Ph.B., 1893, *Detroit.*  
Physiology; Bacteriology; Physiological Chemistry.
- Benjamin Fuller McLouth, B.S., *South Dakota Agricultural College*, 1893, *Brookings, S. Dak.*
- Newton D. Mereness, A.B., 1892, *Marine City.*  
History; Political Economy; American Literature.
- \* William Henry Merner, A.B., 1892, *Cedar Falls, Ia.*  
Political Economy; Philosophy; American History.

- Harriet Lathrop Merrow, A. M., *Wellesley Coll.*, 1893, *Merrow, Conn.*
- † John Ezra Miller, A. B., 1894, *Milledgeville, Ill.*  
Latin; Greek; Classical Archæology.
- Ida May Muma, A. B., 1893, *Ann Arbor.*  
Greek; Latin; Classical Archæology.
- John Augustus Munson, A. B., *Central Univ. of Iowa*, 1891, *Pella, Ia.*  
German; French; Philosophy.
- Harvey Newton Ott, Ph. M., 1891, *Brookings, S. Dak.*
- † Elmer James Ottaway, B. L., 1894, *Ann Arbor.*  
English Literature; History; Political Economy.
- William Walter Parker, B. S., *Mich. Agr. Coll.*, 1893, *Charlotte.*  
Organic Chemistry; General Chemistry; Mineralogy.
- Melvin Park Porter, A. B., 1893, *West Sunbury, Pa.*  
Philosophy; Political Economy; Physiology.
- Dan Lace Quirk, Jr., Ph. B., 1893, *Ypsilanti.*
- Harrison McAllester Randall, Ph. B., 1893, *Ann Arbor.*  
Physics; Organic Chemistry; Quantitative Analysis.
- Henry Frederick Lewis Reichle, A. B., 1893, *Saginaw, East Side.*  
Latin; Greek; Classical Archæology.
- Edwin Carl Roedder, A. B., 1893, *Osterburken, Baden.*  
German; Rhetoric; Anglo-Saxon.
- John Henry Schaffner, A. B., *Baker University*, 1893, *Morganville, Kan.*  
Botany; Animal Morphology; Geology.
- Thomas Chalkley Severance, A. B., 1889, A. M., 1893, *Walled Lake.*
- \*Georgia Smeallie, B. L., 1893, *Independence, Ia.*
- James Allen Smith, A. B., *Univ. of Mo.*, 1886, *Kansas City, Mo.*  
LL. B., *Univ. of Mo.*, 1887,  
Political Economy; Finance; Comparative Constitutional Law.
- † Annah May Soule, B. L., 1894, *Ann Arbor.*  
United States History; Political Economy; Philosophy.
- Clara Frances Stevens, *Mount Holyoke College*, 1881, *Newburyport, Mass.*  
Rhetoric; English Literature; Æsthetics.
- Louis A. Strauss, B. L., 1893, *Ann Arbor.*  
Rhetoric; Philosophy; English Literature.
- Ira Dudley Travis, Ph. B., *Albion College*, 1889, *Albion.*  
European History; Pedagogy; American History.
- Perry Fox Trowbridge, Ph. B., 1892, *Ann Arbor.*  
Organic Chemistry; Physics; Analytical Chemistry.
- † Louise Helmuth Uren, B. L., 1894, *Calumet.*  
Political Economy; Ethics; History.
- \*Raymond Elmoine Van Syckle, B. S., 1891, *Bay City.*  
Political Economy; Political Philosophy; American History.
- Jessie Louise Van Vliet, A. B., *Wellesley College*, 1885, *Oak Park, Ill.*  
Latin; History of Philosophy; Ethics.
- Otto Louis Edgar Weber, B. S., 1893, *Ann Arbor.*  
Mechanical Engineering.

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|-----------------------------------------------------------------------------------------------------------------------------|----------------------|
| † John Wesley Welch, A.B., 1894,<br>Latin; Pedagogy; Roman Archæology.                                                      | <i>Schoolcraft.</i>  |
| Louis Grant Whitehead, A.B., 1893,<br>Ethics; Political Economy; Comparative Constitutional Law.                            | <i>Vulcan.</i>       |
| Pauline Elisabeth Wies, Ph.B., 1892,<br>German; Gothic; French.                                                             | <i>Ann Arbor.</i>    |
| † Delos Franklin Wilcox, A.B., 1894,<br>Ethics; History; Political Economy.                                                 | <i>Raisinville.</i>  |
| Charles Roberts Winegar, B.S., <i>Mich. Agr. Coll.</i> , 1892, <i>Ann Arbor.</i>                                            |                      |
| Robert Henry Wolcott, B.L., 1890, B.S., 1892,<br>M.D., 1893,<br>Vertebrate Morphology; Invertebrate Morphology; Physiology. | <i>Grand Rapids.</i> |
| Clarence George Wrentmore, B.S., 1893,<br>Civil Engineering.                                                                | <i>Ann Arbor.</i>    |
| Harry Dale Wright, A.B., 1893,<br>Greek; Latin; Greek History.                                                              | <i>Ann Arbor.</i>    |

### CANDIDATES FOR A MASTER'S DEGREE AND FOR A DEGREE IN ENGINEERING, STUDYING IN ABSENTIA.

| NAME.                                                                                             | RESIDENCE.                    |
|---------------------------------------------------------------------------------------------------|-------------------------------|
| Wirt McGregor Austin, Ph.B., 1887,<br>Political Economy; Constitutional Law; American Literature. | <i>Lapeer.</i>                |
| Hadley Baldwin, B.S., 1893,<br>Civil Engineering.                                                 | <i>Mattoon, Ill.</i>          |
| William Dearborn Ball, B.S., 1890,<br>Mechanical Engineering.                                     | <i>Chicago, Ill.</i>          |
| Virginia Beauchamp, A.B., 1889,<br>Latin; German; French.                                         | <i>Colorado Springs, Col.</i> |
| Andrew Renick Benson, B.S., 1890,<br>Civil Engineering.                                           | <i>Chicago, Ill.</i>          |
| Alfred Stone Calkins, B.S., 1891,<br>Civil Engineering.                                           | <i>Joliet, Ill.</i>           |
| Mary Sophia Case, A.B., 1884,<br>British Philosophy; Political Philosophy; English Literature.    | <i>Wellesley, Mass.</i>       |
| Edwin Henry Cheney, B.S., 1892,<br>Electrical Engineering.                                        | <i>Chicago, Ill.</i>          |
| Rossetter Gleason Cole, Ph.B., 1888,<br>Music; German; Æsthetics.                                 | <i>Ripon, Wis.</i>            |
| Allen Lysander Colton, A.B., 1890,<br>Astronomical Photography; Optics; Practical Astronomy.      | <i>Mount Hamilton, Cal.</i>   |
| Ernest Ben Conrad, B.S., 1890,<br>Mechanical Engineering.                                         | <i>New York, N. Y.</i>        |
| Charles Hall Cook, A.B., 1874,<br>English Literature; History; Philosophy.                        | <i>Billings, Mon.</i>         |
| George Ellsworth Dawson, A.B., 1887,<br>English Literature; Anglo-Saxon; German.                  | <i>Ann Arbor.</i>             |



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|--------------------------------------------------------------------------------------------------|----------------------------|
| Edwin De Barr, Ph.B., 1892,<br>Organic Chemistry; English; General Chemistry.                    | <i>Norman, O. T.</i>       |
| William Worth Eagan, Ph.B., 1889,<br>Latin; Anglo-Saxon; English Literature.                     | <i>Ann Arbor.</i>          |
| Eugene Gerald Fassett, B.S., 1892,<br>Political Economy; American History; European History.     | <i>Chicago, Ill.</i>       |
| Ida Bertha Paulina Fleischer, Ph.B., 1892,<br>German; Philosophy; Pedagogy.                      | <i>Ludington.</i>          |
| David Emil Heineman, Ph.B., 1887,<br>English Drama; History of the Fine Arts; International Law. | <i>Detroit.</i>            |
| Violet De Lille Jayne, A.B., 1887,<br>English Literature; German; History.                       | <i>San José, Cal.</i>      |
| Jeptha Elmer Lemon, A.B., 1883,<br>Pedagogy; English Literature; Psychology.                     | <i>West Bay City.</i>      |
| William Andrew McAndrew, A.B., 1886,<br>English Drama; History; Pedagogy.                        | <i>Brooklyn, N. Y.</i>     |
| Frank Thomson Merry, B.L., 1890,<br>History; American History; Political Economy.                | <i>Ann Arbor.</i>          |
| Robert Webber Moore, Ph.B., 1887,<br>German; French; German History.                             | <i>Hamilton, N. Y.</i>     |
| Minott Eugene Porter, B.S., 1893,<br>Civil Engineering.                                          | <i>West Richfield, O.</i>  |
| Robert Lemuel Sackett, B.S., 1891,<br>Civil Engineering.                                         | <i>Richmond, Ind.</i>      |
| Henry Arthur Sanders, A.B., 1890,<br>Greek; Latin; Sanskrit.                                     | <i>Ann Arbor.</i>          |
| Lewis Severance, A.B., 1892,<br>French; English Literature; History.                             | <i>St. Johns.</i>          |
| Fred Fraley Sharpless, B.S., 1888,<br>Economic Geology; Metallurgy; Ore Dressing.                | <i>Houghton.</i>           |
| Lillie Maria Shaw, A.B., 1884,<br>Greek; German; Botany.                                         | <i>Bay City.</i>           |
| Lura Wallace Tozer, Ph.B., 1885,<br>English Literature; German; French.                          | <i>Nashville, Tenn.</i>    |
| Hugh Flournoy Van Deventer, B.S., 1892,<br>Mining Engineering.                                   | <i>Knoxville, Tenn.</i>    |
| Allen Sisson Whitney, A.B., 1885,<br>Pedagogy; German; American History.                         | <i>Saginaw, East Side.</i> |

# Graduate Club.

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In January, 1894, an organization of graduate students, known as THE GRADUATE CLUB, was formed.

The objects of the club are to create and foster a spirit of fellowship among its members, to stimulate an interest in graduate work and methods, and to further the welfare of the GRADUATE SCHOOL. All students in the Graduate School are eligible for membership. The number of members at present is about fifty.

At the meetings, which are held monthly, the students and members of the Faculty join in the discussion of questions pertinent to the objects of the club.

During the current year the following subjects have been discussed:

(1) The Relation of the Graduate School to the University.—President ANGELL and Professor DEWEY.

(2) Methods of Note Taking.—Professors SCOTT, REIGHARD, and F. M. TAYLOR.

(3) What Shall we do With our Minor Studies?—Professors ADAMS and HINSDALE.

(4) The Trend of Present Investigation in Greek, German, and English.—Professors D'OOGHE, THOMAS, and HEMPL.

UNIVERSITY OF MICHIGAN

DEPARTMENT OF LITERATURE, SCIENCE, AND THE ARTS

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ANNOUNCEMENT.

OF THE

GRADUATE SCHOOL

1895-96.

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ANN ARBOR, MICH.

PUBLISHED BY THE UNIVERSITY

1895



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## CALENDAR.

**1895.**

- Sept. 23-27. *Examination for Admission to the Department of Literature, Science, and the Arts.*
- Oct. 1. FIRST SEMESTER BEGINS IN ALL DEPARTMENTS OF THE UNIVERSITY.
- Nov. —. Thanksgiving Recess of three days, beginning Tuesday evening, in all Departments of the University.
- Dec. 20. (Evening.) Holiday Vacation begins in all Departments.

**1896.**

- Jan. 7. Exercises resumed.
- Feb. 14. (Evening.) FIRST SEMESTER CLOSES.
- Feb. 17. SECOND SEMESTER BEGINS.
- April 10. (Evening.) Recess begins, ending April 20 (evening).
- June 25. COMMENCEMENT IN ALL DEPARTMENTS OF THE UNIVERSITY.

**FACULTY**  
OF THE  
DEPARTMENT OF LITERATURE, SCIENCE, AND THE ARTS.

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**Professors and Assistant Professors.**

JAMES B. ANGELL, LL.D., *President.\**

ALBERT B. PRESCOTT, PH.D., M.D., *Director of the Chemical Laboratory, and Professor of Organic Chemistry.*

REV. MARTIN L. D'OOGHE, LL.D., *Dean, and Professor of the Greek Language and Literature.*

CHARLES E. GREENE, A.M., C.E., *Professor of Civil Engineering.*

WILLIAM H. PETTEE, A.M., *Professor of Mineralogy, Economic Geology, and Mining Engineering.*

EDWARD L. WALTER, PH.D., *Professor of Romance Languages and Literatures.*

ISAAC N. DEMMON, A.M., *Professor of English and Rhetoric.*

ALBERT H. PATTENGILL, A.M., *Professor of Greek.*

MORTIMER E. COOLEY, M.E., *Professor of Mechanical Engineering.*

WOOSTER W. BEMAN, A.M., *Professor of Mathematics.*

VICTOR C. VAUGHAN, PH.D., M.D., *Professor of Hygiene and Physiological Chemistry, and Director of the Hygienic Laboratory.*

CHARLES S. DENISON, M.S., C.E., *Professor of Descriptive Geometry, Stereotomy, and Drawing.*

HENRY S. CARHART, LL.D., *Professor of Physics, and Director of the Physical Laboratory.*

RAYMOND C. DAVIS, A.M., *Librarian.*

VOLNEY M. SPALDING, A.B., *Professor of Botany.*

HENRY C. ADAMS, PH.D., *Professor of Political Economy and Finance.*

CALVIN THOMAS, A.M., *Professor of Germanic Languages and Literatures.*

BURKE A. HINSDALE, LL.D., *Professor of the Science and the Art of Teaching.*

RICHARD HUDSON, A.M., *Professor of History.*

ALBERT A. STANLEY, A.M., *Professor of Music.*

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\* The President lectures upon International Law and the History of Treaties.

FRANCIS W. KELSEY, PH.D., *Professor of the Latin Language and Literature.*

OTIS C. JOHNSON, PH.C., A.M., *Professor of Applied Chemistry.*

PAUL C. FREER, PH.D., M.D., *Professor of General Chemistry, and Director of the Laboratory of General Chemistry.*

ANDREW C. McLAUGHLIN, A.B., LL.B., *Professor of American History.*

JOSEPH B. DAVIS, C.E., *Professor of Geodesy and Surveying.*

ASAPH HALL, JR., PH.D., *Professor of Astronomy, and Director of the Observatory.*

ISRAEL C. RUSSELL, M.S., C.E., *Professor of Geology.*

WARREN P. LOMBARD, A.B., M.D., *Professor of Physiology and Histology.*

JACOB E. REIGHARD, PH.B., *Professor of Animal Morphology.*

THOMAS C. TRUEBLOOD, A.M., *Professor of Elocution and Oratory.*

JAMES A. CRAIG, PH.D., *Professor of Semitic Languages and Hellenistic Greek.*

JOHN C. ROLFE, PH.D., *Professor of Latin.*

FREDERICK G. NOVY, Sc.D., M.D., *Junior Professor of Hygiene and Physiological Chemistry.*

GEORGE HEMPL, PH.D., *Junior Professor of English.*

EDWARD D. CAMPBELL, B.S., *Junior Professor of Metallurgy and Metallurgical Chemistry.*

FRED M. TAYLOR, PH.D., *Junior Professor of Political Economy and Finance.*

PAUL R. DE PONT, A.B., B.S., *Registrar, and Assistant Professor of French.*

CLARENCE G. TAYLOR, B.S., *Superintendent of Shops in Engineering Laboratory.*

JOSEPH H. DRAKE, A.B., *Assistant Professor of Latin.*

FRED N. SCOTT, PH.D., *Assistant Professor of Rhetoric.*

FRANK N. COLE, PH.D., *Assistant Professor of Mathematics.*

ALEXANDER ZIWET, C.E., *Assistant Professor of Mathematics.*

GEORGE W. PATTERSON, JR., A.M., S.B., *Assistant Professor of Physics.*

GEORGE A. HENCH, PH.D., *Assistant Professor of German.*

FRANK C. WAGNER, A. M., B.S., *Assistant Professor of Mechanical Engineering.*

G. CARL HUBER, M.D., *Assistant Professor of Histology.*

JOHN O. REED, PH.M., *Assistant Professor of Physics.*

DEAN C. WORCESTER, A.B., *Assistant Professor of Animal Morphology.*



FREDERICK C. NEWCOMBE, PH.D., *Acting Assistant Professor of Botany.*

ALFRED H. LLOYD, PH.D., *Acting Assistant Professor of Philosophy.*

### Instructors and Assistants.

JOSEPH L. MARKLEY, PH.D., *Instructor in Mathematics.*

MORITZ LEVI, A.B., *Instructor in French.*

ELMER A. LYMAN, A.B., *Instructor in Mathematics.*

GEORGE O. HIGLEY, M.S., *Instructor in General Chemistry.*

JONATHAN A. C. HILDNER, A.M., *Instructor in German.*

DAVID M. LICHTY, M.S., *Instructor in General Chemistry.*

BENJAMIN P. BOURLAND, A.M., *Instructor in French.*

JOHN R. EFFINGER, JR., PH.M., *Instructor in French.*

LORENZO N. JOHNSON, A. M., *Instructor in Botany.*

HERBERT F. DE COU, A.M., *Instructor in Greek and Sanskrit.*

ERNEST H. MENSEL, A.M., *Instructor in German.*

LAWRENCE A. McLOUTH, A.B., *Instructor in German.*

EARLE W. DOW, A.B., *Instructor in History.*

GEORGE E. DAWSON, A.B., *Instructor in English.*

MOSES GOMBERG, Sc.D., *Instructor in Organic Chemistry.*

CLARENCE G. WRENTMORE, B.S., *Instructor in Descriptive Geometry and Drawing.*

KARL E. GUTHE, PH.D., *Instructor in Physics.*

TOBIAS DIEKHOF, A.B., *Instructor in German.*

GEORGE A. MILLER, PH.D., *Instructor in Mathematics.*

W. FRANKLIN EDWARDS, B.S., *Instructor in Organic Chemistry.*

SIDNEY D. TOWNLEY, M.S., *Instructor in Astronomy.*

MAX WINKLER, PH.D., *Instructor in German.*

HENRY A. SANDERS, A.M., *Instructor in Latin.*

CLARENCE L. MEADER, A.B., *Instructor in Latin.*

CHARLES A. KOFOID, PH.D., *Instructor in Vertebrate Morphology.*

WALLACE S. ELLEN, A.M., *Instructor in French.*

ARTHUR G. HALL, B.S., *Instructor in Mathematics.*

WILLIAM D. JOHNSTON, A.M., *Instructor in History.*

GEORGE REBEC, PH.B., *Instructor in Philosophy.*

FRANK R. LILLIE, PH.D., *Instructor in Zoology.*

DANIEL B. LUTEN, B.S., *Instructor in Engineering.*

REV. JOHN BIGHAM, PH.D., *Instructor in Philosophy.*

ALICE L. HUNT, *Assistant in Drawing.*

CHARLES H. COOLEY, PH.D., *Assistant in Political Economy.*

FRANK H. DIXON, PH.B., *Assistant in Political Economy.*

PERRY F. TROWBRIDGE, PH.B., *Assistant in Qualitative Analysis.*

JOHN B. JOHNSTON, PH.B., *Assistant in Invertebrate Morphology.*

LOUIS A. STRAUSS, PH.M., *Assistant in English.*

WARREN H. LEWIS, B.S., *Assistant in Vertebrate Morphology.*

CARLTON D. MORRIS, M.D., *Assistant in Physiological Chemistry.*

JOHN H. SCHAFFNER, A.M., *Assistant in the Botanical Laboratory.*

EDWIN H. EDWARDS, B.S., *Assistant in the Botanical Laboratory.*

WILLARD C. GORE, PH.B., *Assistant in English.*

JOHN P. DAVIS, PH.D., *Assistant in Political Economy.*

# ANNOUNCEMENT OF THE GRADUATE SCHOOL.

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## GENERAL INFORMATION.

### **The University of Michigan.**

The University of Michigan is a part of the educational system of the State, and derives from the State, in one way or another, the greater part of its revenue. The University comprises the Department of Literature, Science, and the Arts, and five professional schools, each of which has its own Faculty and issues each year a separate departmental Announcement. The various faculties aggregated, in 1894-95, one hundred and twenty-nine officers of instruction, besides numerous assistants, some of whom participate in the work of teaching. More than twenty-eight hundred students, representing forty-seven States and Territories, and sixteen foreign countries, were in attendance.

### **The Department of Literature, Science, and the Arts.**

The Department of Literature, Science, and the Arts combines under one organization the different lines of work that are often represented elsewhere by the names college, scientific school, and school of technology. Its faculty numbered, in 1894-95, eighty-three teachers. The students in attendance numbered over fifteen hundred, of whom sixty-two were graduates. The presence of such a number of graduate students, taken with the fact that high specialization of work is not uncommon among undergraduates, tends to create a genuine university atmosphere, and to assure the advanced student of intellectual comradeship.

### **The Libraries.**

The various libraries of the University contain about 92,200 volumes, and include a number of important special collections. Among these are the McMillan Shakespeare Library, 3,610 volumes; the Parsons Library (political science), 4,325 volumes; the Hagerman Collection (history and political science), 2,660 volumes, and a Goethe Library of 875 volumes. The general reading room seats two hundred and ten readers, and sepa-

rate rooms are provided for advanced students to work in, with the necessary books close at hand. Under certain restrictions graduate students have access to the book rooms. The library takes about three hundred periodicals, and is open, in term time, twelve and one-half hours daily, except on Sundays and legal holidays.

### **The Laboratories.**

The University has an observatory and a large number of laboratories more or less fully equipped for routine instruction and for original research. These laboratories are (omitting those connected exclusively with the work of the Medical and Dental Schools): the Botanical, Chemical, Engineering, Geological, Histological, Hygienic, Morphological, Physical, Physiological, Psychological, and Zoological. For a fuller account of them and their various resources, as also of the University collections for the study of art, archæology, ethnology, mineralogy, palæontology, systematic zoology, etc., consult the annual Calendar, which may be had gratis on application to Mr. James H. Wade, Secretary of the University.

### **The Scientific Societies.**

There are connected with the University a number of voluntary scientific organizations which add not a little to the graduate student's opportunity for scientific training. The membership of these societies consists usually of University teachers and advanced students who are pursuing a common specialty. They are variously organized and meet weekly, fortnightly, or monthly, as the case may be, for the reading and discussion of formal papers, for reports upon observation and experiment, reviews of recent technical literature, etc.

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## **ORGANIZATION OF GRADUATE WORK.**

### **The Graduate School.**

The Graduate School was organized in the Spring of 1892 in connection with the Department of Literature, Science, and the Arts. Its purpose is to bring into increased prominence the numerous advanced courses offered in that department—courses that have developed during the past few years from the continual extension of the elective system,—and to recognize and announce them as something distinct from the work of an ordinary college course. It aims to make provision for a more systematic and efficient administration of this higher work, and, so far as possible, for the separate instruction of graduate students. It also aims to lay foundations for the future development of university (as distinguished from collegiate) work. The management of the School is

entrusted to an Administrative Council, consisting of the heads of departments of instruction, with the President of the University as chairman.

The regulations of the University respecting graduate work, that were formerly in force, have been modified in a few particulars by the Council, and it is possible that still further changes may be made in the year to come. The more important of these regulations are explained in the pages that follow.

### **The University System.**

Every graduate student who is a candidate for a higher degree, works upon the so-called 'university system,' the essential features of which are specialization of study, a final examination, and a thesis. The student selects a 'major study' and, in general, two 'minor studies,' his selection being subject, however, to the approval of the Council. When the choice has been made and approved, the student's work is henceforth under the immediate supervision of a committee consisting of those professors who have charge of the studies chosen, the one having charge of the major study being chairman. This committee arrange a course of study suited to the desires, needs, and previous attainments of the student, assist him in the choice of a subject for a thesis, pass judgment upon his thesis when it is written, conduct his examination, and, if he passes, report him to the Council as worthy of the degree sought. The nature of the work prescribed, and of the committee's oversight, varies more or less according to the subjects chosen, the degree sought, and the previous attainments of the student. The work may consist of attendance upon certain specified courses of study, of reading to be done privately and reported upon, or of an original research to be carried on more or less independently. The requirement of a thesis is sometimes waived in the case of a candidate for a *master's* degree. It may be added also that for the master's degree the Council may, at their discretion, approve a course of study which does not confine the candidate rigorously to a major and two minor studies.

Graduate students who do not wish to work for a higher degree are admitted to any course offered in the Department upon satisfying the professor in charge that they are qualified to pursue the work to advantage.

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## **THE HIGHER DEGREES.**

### **Degrees Conferred.**

The higher degrees conferred in the Department of Literature, Science, and the Arts, are those of Master of Arts, Master of Science, Master of Philosophy, Master of Letters, Doctor of Philosophy, Doctor of Science, Doctor of Letters, Civil Engineer, Mechanical Engineer, Mining Engineer, and Electrical Engineer.

### The Masters' Degrees.

A Bachelor of this University, or of any other reputable university or college, may become a candidate for the corresponding master's degree, and may be recommended for the degree after one year's residence at the University, provided he pass a satisfactory examination on the course of study prescribed by his committee. A thesis may, or may not, be included in the requirements for a degree, as the committee in charge of the student's work may determine.

The practice of allowing graduates of this University to enter upon studies *in absentia* as candidates for a master's degree, has been discontinued. But a graduate who has already completed a considerable portion of the term of residence prescribed for a master's degree, may be allowed to continue his studies for the degree, without further residence at the University, on such conditions as the Administrative Council may determine in each case. *This privilege is restricted to graduates of this University.*

Students properly qualified may be permitted to pursue at the same time studies for a master's degree, and studies in any of the professional schools, on condition that the term of study and residence in the Graduate School be extended to cover two years instead of one.

### The Doctors' Degrees.

1. The degree of Doctor of Philosophy is open to persons that have received the degree of Bachelor of Arts, or of Bachelor of Philosophy; the degree of Doctor of Science to persons that have received the degree of Bachelor of Science; and the degree of Doctor of Letters to persons that have received the degree of Bachelor of Letters; but no student will be accepted as a candidate for the doctor's degree who has not a knowledge of French and German sufficient for purposes of research.

2. It is not intended that the doctors' degrees shall be won merely by faithful and industrious work for a prescribed time in some assigned course of study, and no definite term of required residence can be specified. As a rule, three years of graduate study will be necessary, the last two semesters of which must be spent at this University. The period of three years, however, may be shortened in the case of students who, as undergraduates, have pursued special studies in the direction of their proposed graduate work.

3. No student will be enrolled as a candidate for the doctor's degree until he has been in residence as a graduate student for at least one year. [This rule may be waived in the case of those who come properly accredited from a Graduate School of some other University, and of those who, as undergraduates in this University, have shown special proficiency in the line of their proposed graduate work.]

4. A student wishing to become a candidate for the doctor's degree must make a formal application to be so enrolled at least two semesters prior to the time of presenting himself for examination.

5. A candidate for a doctor's degree must take a major study that is substantially co-extensive with some one department of instruction in the University. He must also take two minor studies, one of which may be in the same department as the major, but involving a more thorough treatment of the same. Both minors must be cognate to the major, and all studies must be subject to the approval of the Administrative Council.

6. THE THESIS.—The thesis is of great importance. It must exhibit creditable literary workmanship and a good command of the resources of expression, but it must depend for acceptance more upon its subject-matter than upon its formal or rhetorical qualities. It must be an original contribution to scholarship or to scientific knowledge. The inquiry should be confined within narrow bounds. The treatment should be as concise as the nature of the subject permits, and show familiarity with the history of the problem treated, with the literature bearing upon it, and with the latest methods of research applicable to it. Every thesis should contain a clear introductory statement of what it is proposed to establish or investigate, and likewise a final resumé of results. It should also be accompanied by an index of contents and a bibliography of the subject. It is expected that the preparation of an acceptable thesis will usually require the greater part of one academic year.

### **The Higher Degrees in Engineering.**

The degree of Civil Engineer may be conferred upon Bachelors of Science of this University who have taken the degree for a course in civil engineering, if they furnish satisfactory evidence that they have pursued further technical studies for at least one year, and, in addition, have been engaged in professional work, in positions of responsibility, for another year. The first of the above requirements may be satisfied by pursuing at the University, under the direction of the Council, a prescribed course of study for an amount of time, not necessarily consecutive, equivalent to an academic year. If the candidate does not reside at the University, his course of study must be approved in advance by the professor of civil engineering, and he must prepare a satisfactory thesis on some engineering topic, to be presented, together with a detailed account of his professional work, one month, at least, before the annual Commencement at which he expects to secure the degree.

The conditions on which the degrees of Mechanical Engineer, Mining Engineer, and Electrical Engineer are conferred, as second degrees, upon Bachelors of Science of this University who have taken the degree for a course in Mechanical Engineering, Mining Engineering, or Electrical

Engineering, are analogous in character to those prescribed for the degree of Civil Engineer.

### **Special Regulations Relating to the Higher Degrees.**

1. Applicants for an advanced degree are required to announce to the Council, through the President, as early as the fifteenth of October of each year, the particular branches of study to which they wish to give special attention. The supervision of their work will then be entrusted to the proper committee.

2. The subject of the thesis for a doctor's degree must be chosen, and must be approved by the committee concerned, as early as the first of November of the college year in which the applicant expects to take his degree, and the subject of the thesis, when required for a master's degree, must be chosen and approved as early as the first of December.

3. The thesis must be completed and put into the hands of the chairman of the proper committee as early as the first of May of the year in which the applicant expects to take the degree.

4. The thesis must be prepared for close scrutiny with reference not only to its technical merits, but also to its merits as a specimen of literary workmanship. It must be preceded by an analytical table of contents, and a carefully prepared account of the authorities made use of.

5. The thesis must be read and defended in public at such time as the Council may appoint; and, in case of a master's degree, a bound copy, either written or printed, must be deposited in the University library.

6. Candidates for the degree of Doctor of Philosophy, Doctor of Science, or Doctor of Letters, in case of the acceptance of their theses, are required to have the accepted theses printed, in full or in part as may be approved by the responsible committee, and to present twenty-five copies of the same to the University library. To guarantee the printing of the thesis every candidate for the doctor's degree will be required to deposit with the Treasurer of the University, between the date of the acceptance of his thesis and the time fixed for his examination, the sum of fifty dollars, which deposit will be returned to him in case of failure to pass his examination, or whenever he shall cause his thesis to be printed at his own expense, or shall have it published in a form and under auspices approved by the responsible committee.

In the printing of the thesis at his own expense the candidate will be expected to use good substantial paper and sightly typography. A page four inches by six, with outside margins of at least one inch, is recommended.



## ADMISSION AND REGISTRATION.

All applicants for admission to the Graduate School must first report to the President and present their credentials.

The privileges of the school are open to graduates of the Department of Literature, Science, and the Arts of this University, and to graduates of other universities and colleges who satisfy the Administrative Council that they are qualified to pursue with profit the advanced courses of study offered in the school.

Graduates of institutions where the undergraduate courses of study are not substantially equivalent to the course prescribed at this University will ordinarily be required to do an additional amount of undergraduate work, or to prolong their term of residence, before being admitted to full candidacy for a higher degree.

Graduates of this University, or of other institutions, who do not wish to become candidates for a degree, may be admitted and registered as special resident graduates.

Graduates of other institutions who are candidates for a bachelor's degree in the Department of Literature, Science, and the Arts, are not registered in the Graduate School.

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## FEES AND EXPENSES.

**Matriculation Fee.**—Every student before entering any department of the University is required to pay a matriculation fee. This fee, which, for citizens of Michigan, is ten dollars, and for those who come from any other state or country, twenty-five dollars, is paid but once, and entitles the student to the privileges of permanent membership in the University.

**Annual Fee.**—In addition to the matriculation fee, every student has to pay an annual fee for incidental expenses. This fee in the Department of Literature, Science, and the Arts is, for Michigan students, twenty-five dollars; for all others, thirty-five dollars. It is paid the first year of residence at the University, and every year of residence thereafter. Resident graduates are required to pay the same annual fee as undergraduates. Graduate students studying *in absentia* for a master's degree pay an annual fee of ten dollars.

The matriculation fee and the annual fee must be paid at the beginning of the academic year. A by-law of the Board of Regents provides that no student or graduate shall be allowed to enjoy the privileges of the University until he has paid all fees that are due.

**Laboratory Expenses.**—Students who pursue laboratory courses of study are required to pay for the materials and apparatus actually consumed by them. The deposits required in advance are different in the

different courses, ranging from one to twenty dollars. The laboratory expenses of students will vary with their prudence and economy. Experience has shown that in the chemical laboratory the average expense for all courses is about one dollar and twenty cents a week.

**Diploma Fee.**—The fee for the diploma given on graduation is ten dollars, and the by-laws of the Board of Regents prescribe that no person shall be recommended for a degree until he has paid all dues, including the fee for diploma.

**Other Expenses.**—Students obtain board and lodging in private families for from three to five dollars a week. Clubs are also formed in which the cost of board is from one dollar and a half to two dollars and a half a week. Room rent varies from one dollar to three dollars a week for each student. The annual expenses of students, including clothing and incidentals, are, on the average, about three hundred and seventy dollars.

There are no dormitories, no commons, and no stipends connected with the University (with the exception of the Elisha Jones classical fellowship, a fellowship in chemistry, and a fellowship in research in the School of Pharmacy). Students on arriving in Ann Arbor can obtain information in regard to rooms and board by calling at the Steward's office.

## COURSES OF INSTRUCTION.

The following list of advanced courses does not attempt in all cases to discriminate graduate from undergraduate instruction; the reason being that the possession of a bachelor's degree may mean much or little as regards a student's proficiency in a particular subject. With a few exceptions, the courses here mentioned all presuppose a somewhat extensive preliminary study of the subject, a study covering from one to six years, according to the circumstances. In most instances the attempt is made to indicate, in terms of both time and work, the amount of preparation required for entrance upon the courses described. Many of the courses are advanced electives which are open to undergraduates, but have been shown by experience to be suited to the needs of many graduates. Different departments of instruction have adopted different modes of announcing and explaining their work. For further information reference may be made directly to the head of the department concerned.

### GREEK.

The courses here announced presuppose, in general, four years' previous study of Greek, viz., the usual preparatory course of two years, and two years of collegiate study devoted to the history of Greek literature and to reading from Lysias, Xenophon, Homer, Demosthenes, the Tragic Poets, and Aristophanes.

A Classical Club meets once in two weeks, for the purpose of discussing new books, of making reports on new discoveries in archæological exploration and on the contents of philological journals, and of reading brief papers on questions of classical philology. Graduate students are admitted to membership in this club and to a share in its work.

Professor D'OUGE:—

### Teachers' Seminary.

This course is intended to give students who expect to teach Greek training in teaching the elements of inflection and syntax. In the first semester, lectures will be given on the chief results of the modern comparative treatment of Greek sounds and inflections. In the second semester, the course will include the writing of Greek Prose, and a discussion of the principles of Greek Syntax.—*Two hours a week, throughout the year.*

### Seminary in Tragedy.

The Orestean Trilogy of Aeschylus. The reading will be accompanied by a discussion of the principles of Greek dramatic art and by a study of the chief points of textual criticism.—*Three hours a week, first semester.*

### The History of Greek Art from the beginnings to the Roman Period.

Von Reber's History of Ancient Art and Collignon's Manual of Greek Archæology will be made the basis of a more general study.—*Three hours a week, first semester.*

### Aristotle's Ethics.

Selections. The course is especially designed for students of Greek philosophy, and will be accompanied by discussions and essays on themes connected with the work in hand.—*Two hours a week, first semester.*

### Seminary in the Legal and Political Antiquities of the Athenians.

The text read will be the newly discovered Athenian Constitution of Aristotle. Special topics for investigation will be assigned to members of the class.—*Two hours a week, second semester.*

Professor PATTENGILL:—

### Thucydides, Books VII and VIII.

Special topics of study in Athenian legal and political antiquities will be assigned.—*Three hours a week, first semester.*

### The Greek Lyric Poets.

Stadtmüllers Selections.—*Three hours a week, second semester.*

### Seminary in Euripides.

*Two hours a week, second semester.*

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### Introduction to Greek Epigraphy and Reading of Inscriptions.

*Three hours a week, first semester.*

## HELLENISTIC GREEK.

Professor CRAIG:—

### New Testament.

Epistle to the Romans; I Corinthians; The Athenian Fragment of the Gospel of Peter discovered in 1887. Text-Books: Westcott and Hort's Greek New Testament, revised American edition with introduction by Ph. Schaff; Thayer's Winer's New Testament Grammar; Thayer's Greek-English Lexicon; Bruchstücke des Evangeliums und der Apokalypse des Petrus, von Adolph Harnack, zweite Ausgabe.—*Two hours a week, first semester.*

### Old Testament and Josephus.

Selections from the Prophets. Josephus:—To Epaphroditus "Against Apion," the *πρὸς τοὺς Ἑλλήνας* of Porphyry, the *περὶ τῆς τῶν Ἰουδαίων ἀρχαίότητος* of Eusebius, circa 95 A. D. (a highly interesting work which every student of Greek should read). Text books: *Vetus Testamentum Graece* by L. Van Ess, or *The Old Testament in Greek* by H. B. Swete, Vols. I-III; Grammar and Lexicon as in the first semester.—*Two hours a week, second semester.*

## LATIN.

The courses here announced presuppose, in general, seven years' previous study of Latin, viz., the usual preparatory course of four years, and three years of collegiate study devoted to Livy, Cicero, Horace, Terence, Latin writing, and the systematic study of Roman literature.

A Classical Club meets once in two weeks for the purpose of discussing new books, of making reports on new discoveries in archaeological exploration and on the contents of philological journals, and of reading brief papers on questions of classical philology. Graduate students are admitted to membership in this club and to a share in its work.

## Professor KELSEY:—

## Graduate Seminary.

Critical study of the *Dialogus of Tacitus*. Open to graduate students only.—*Two hours a week, throughout the year.*

## Teachers' Seminary.

Interpretation of selected portions of Caesar and Vergil, with investigation of syntactical subjects.—*Three hours a week, throughout the year.*

Lucretius, *De Rerum Natura*. Interpretation and Lectures.

*Three hours a week, first semester.*

## [Introduction to Classical Philology. Lectures.

A brief outline of the history and present condition of classical studies is presented, followed by an extended discussion of the methods employed in classical philology. Attention is also paid to the bibliography of the subject. Several lectures in this course will be given by other members of the classical faculty.—*Three hours a week, first semester.* This course is omitted in 1895-96, but may be expected in 1896-97.]

## Introduction to Roman Archæology.

Lectures on the architecture and topography of Ancient Rome, and on sculpture and painting in the Roman period. The course will be illustrated by photographs, engravings, and the occasional use of stereopticon slides.—*Four hours a week, second semester.*

## [Latin Inscriptions.

Reading of inscriptions of different periods from squeezes and facsimiles. Interpretation of inscriptions with special reference to the study of life and society under the Early Empire.—*Three hours a week, second semester.* This course is omitted in 1895-96, but may be expected in 1896-97.]

## Professor ROLFE:—

## Latin Grammar.

Lectures on the phonology and morphology of the Latin language, with an outline of the syntax scientifically considered.—*Four hours a week, second semester.*

## The Italic Dialects.

Lectures on the phonology and morphology of the dialects, with the interpretation of selected inscriptions. *Three hours a week, second semester.*

### Latin Writing.

Attention is given not only to correctness of expression but also to matters of style and the finer distinctions of the language.—*Two hours a week, first semester; three hours a week, second semester.*

### [The Letters of Cicero.

Interpretation of selected letters, with study of the Latin epistolary style.—*Three hours a week, second semester.* This course is omitted in 1895-96, but may be expected in 1896-97.]

### The Letters of Pliny the Younger.

Interpretation of selected letters, with study of Roman life and society at the end of the first century, A. D.—*Three hours a week, second semester.*

### Assistant Professor DRAKE:—

#### Selections from the Annals of Tacitus.

Interpretation and lectures.—*Three hours a week, first semester.*

### [Suetonius and Velleius Paterculus.

Lectures and interpretations.—*Three hours a week, first semester.* This course is omitted in 1895-96, but may be expected in 1896-97.]

### Historical Proseminary.

Study of historical subjects from the sources. The Age of the Antonines.—*Three hours a week, second semester.*

### The Tusculan Disputations of Cicero.

Rapid reading, with an examination of Cicero's philosophical views.—*Three hours a week, second semester.*

### Mr. MEADER:—

#### The Institutes of Gaius and Justinian.

Interpretation of the text, with special study of the technical terms of the Roman Law.—*Three hours a week, second semester.*

### SEMITICS.

For the undergraduate courses in Semitics, not enumerated below, given in the Department of Literature, Science, and the Arts, reference may be made to the annual Announcement of that Department. In Assyrian, in addition to courses for beginners, advanced courses are offered to students who have studied the language for two or more semesters.

## Professor CRAIG:—

## Hebrew.

Prophetic Literature: Hosea and Jeremiah. Study of the nature and content of prophecy in its literary, historical, and ethical aspects. Text-books: Hebrew Bible, Driver's Hebrew Moods and Tenses.—*Two hours a week, first semester.*

## Hebrew.

The Book of Job, including study of the literary structure, critique of the dominant ideas, and comparison with passages from Homer, Milton, Shakespeare, and Goethe's Faust. "His colloquies are the fountain-head from which the great river of philosophic poetry took its origin." Cheyne. Text-book: Baer and Delitzsch's Text.—*Two hours a week, second semester.*

## Assyrian.

The Inscriptions of Nabonidus (555-538 B. C.), I. R., 69, V. R., 64, etc. Inscription of Cyrus, V. R., 35; the East India Inscription of Nebuchadnezzar (604-561 B. C.) in archaic characters, I. R., 53-58, 641 lines. Ancient Babylonian Hymns (circa 2000 B. C.), IV. R. Text-books: Cuneiform Inscriptions of Western Asia, Vols. I, IV, and V (the abbreviations I. R., etc., above, refer to this work); Delitzsch's Assyrian Grammar (either German or English).—*Two hours a week, throughout the year.*

## Arabic.

Introductory Course. Grammar and reading. Text-book: Socin's Arabic Grammar, sixty pages of text and a glossary (German or English edition).—*Two hours a week, second semester.*

The unparalleled adherence to law in the structure of the Arabic language, its perspicuity and development, apart from its exhibiting, in common with other Semitic languages, points of view quite unlike those of the Indo-Aryan group, make it an almost indispensable part of the studies of the linguist.

## FRENCH.

Students will not be considered as taking graduate work in French, whether graduates of this University or of any other institution, who have not had the equivalent of at least Courses 1, 2, 3, 6, 7, 8, 20, and 21, as given in the undergraduate department of the University and described in the University Calendar for 1894-95, pages 58-60. These courses include grammar and composition, the reading of classic and modern prose, and the classic and modern drama.

Graduate work is either chiefly literary or chiefly linguistic, but it is expected that for the doctor's degree at least, and it is advised that for the master's degree as well, some work shall be done in both directions.

For students who choose to direct their work chiefly to the literature, opportunity will be given in the *first semester* of 1895-96 to study the Eighteenth Century dramatists, the Sixteenth Century literature, and some of the leading French philosophical writers; in the *second semester* the Seventeenth Century literature, the pre-revolutionary literature, Voltaire, Montesquieu, Rousseau, etc., the romantic movement at the beginning of the present century, and the satirical spirit in French literature. Private work will be assigned when it is thought desirable by the Professor in charge.

The oldest French literature will be studied in connection with the study of Old French, which will be continued *throughout the year*.

A teachers' course in French will be open to candidates for a master's degree who intend to teach that language.

The courses in French will be given by, or under the direction of, Professor WALTER.

### ITALIAN.

Students will not be considered as taking graduate work in Italian, who have not had the equivalent of Courses 1 and 2 as described in the University Calendar for 1894-95, page 60. In 1895-96, courses in Dante's *Divina Commedia* and *Vita Nuova* will be offered.

The courses in Italian will be given by, or under the direction of, Professor WALTER.

### SPANISH.

Students will not be considered as taking graduate work in Spanish, who have not had the equivalent of Courses 1 and 2 as described in the University Calendar for 1894-95, page 61. In 1895-96, dramas of Lope and Calderon will be offered.

The courses in Spanish will be given by, or under the direction of, Professor WALTER.

### GERMAN.

The undergraduate courses, not here mentioned, provide for four years' study, five hours a week. Considerably less than that, however, is a satisfactory preparation for the courses described below.

Professor THOMAS:\*—

Goethe's *Faust*.

Recitations and lectures upon the interpretation of the text, Thomas's edition being used for Part I, Schröer's for Part II. The

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\*Professor THOMAS has leave of absence for the year 1895-96, and the three courses offered by him will probably be given by Assistant Professor HENCH and Dr. WINKLER.



course is open to advanced undergraduates, but is suitable for graduates also. Graduates taking the course will, upon request, be organized into a separate class to meet once a week for the study of special problems in Faust-criticism.—*Two or three hours a week, throughout the year.*

### Teachers' Course.

Intended specially for those, whether graduates or advanced undergraduates, who are preparing to teach German in secondary schools. Several kinds of work are carried on more or less simultaneously: (1) Critical study of selected masterpieces, with German essays; (2) Lectures and quizzes in German upon the history of modern German literature; (3) Lectures, reports, and discussions upon methods of teaching, text-books, etc.; (4) Lectures upon German grammar from a pedagogical point of view.—*Three hours a week, throughout the year.*

### History of German Literature.

Lectures accompanying systematic readings from Müller's German Classics. The period covered extends from the earliest times to the middle of the nineteenth century. The course is an advanced elective for undergraduates, but is suited to the needs of graduates that have never taken a general survey of German literature in its historical development.

### [Graduate Seminary.

Original research. Open to graduates only.—*Once a week, one or two hours, throughout the year.* This course is omitted in 1895-96, but may be expected in 1896-97.]

### Assistant Professor HENCH:—

#### Old High German.

Introductory course. Text-books: Braune's *Althochdeutsche Grammatik*, 2nd ed., and Braune's *Althochdeutsches Lesebuch*, 3rd ed. Primarily for graduates.—*Three hours a week, second semester.*

#### Historical and Comparative German Grammar.

First semester, phonology and morphology; second semester, syntax.—*Two hours a week, throughout the year.*

### Mr. MENSEL:—

#### Middle High German.

Introduction to language and literature. Lectures and recitations. Text-books: Paul's *Mittelhochdeutsche Grammatik*, 3rd ed., and Weinhold's *Mittelhochdeutsches Lesebuch*, 4th ed. An advanced

elective for undergraduates, but suitable for graduates who have not yet begun the study of Middle High German.—*Two hours a week, first semester.*

### The Nibelungenlied.

Reading, with lectures on language, mythological elements, and composition of the epic. Continuation of the last named course.—*Two hours a week, second semester.*

## GOTHIC.

Assistant Professor HENCH:—

### Introductory Course.

Wright's Primer. Primarily for graduates.—*Three hours a week, first semester.*

### Advanced Course.

Continuation of last named. Epistles and Skeireins as contained in Heyne's *Ulphilas*, 8th ed. Lectures on Historical Grammar based on Kluge's *Vorgeschichte der altgermanischen Dialekte*.—*Two hours a week, second semester.*

## ENGLISH AND RHETORIC.

The advanced work of this department proceeds along three main lines:—English and American Literature; History and Philology of the English Language; and Rhetoric. Advanced courses in Oratory are also offered in connection with this department.

The following courses (open also to undergraduates who are prepared to take them) will ordinarily be found adapted to the needs of graduate students. In case of students who have specialized in English for their first degree, additional advanced courses for graduate study are provided after conference with the candidate. Some of the courses given in recent years are the following: The Development of the English Novel; The English Satirists of the Seventeenth and Eighteenth Centuries; The Romantic Revival in England at the close of the last century; The Pre-Shakespearian Drama in England; Shakespeare's Histories.

Professor DEMMON:—

### English Literature Seminary.

Each student is expected, first, to present two papers during the semester, one an essay upon an assigned masterpiece, the other a critique of a fellow-student's essay; second, to participate each week in a general *ex tempore* discussion of the work under consideration; third, to read the entire list of works with which the course deals, to-

gether with such critical literature on each subject as there may be time for. The aim of the course is to lay a foundation for correctly estimating literary masterpieces of widely varying types. The list of masterpieces is as follows: More's *Utopia*; Bacon's *Essays*; Milton's *Areopagitica*; Carlyle's *Sartor Resartus*; George Eliot's *Silas Marner*; Spenser's *Faery Queen*, Book I; Shakespeare's *Sonnets*; Milton's *Paradise Lost*; Dryden's *Absalom and Achitophel*; Pope's *Essay on Man*; Wordsworth's *Excursion*; Browning's *Soul's Tragedy*; Tennyson's *Maud*; Swinburne's *Atalanta in Calydon*.—*First semester.*

### Shakespeare Seminary.

The method is similar to that in the preceding course. The plays selected are: *A Midsummer Night's Dream*; *The Merchant of Venice*; *As You Like It*; *Twelfth Night*; *The Tempest*; *Richard III*; the two parts of *Henry IV*; *Henry V*; *Hamlet*; *Othello*; *King Lear*; *Macbeth*; *Coriolanus*.—*Second semester.*

### American Literature Seminary.

Authors studied: Irving, Poe, Hawthorne, Bryant, Longfellow, Emerson, Thoreau, Bayard Taylor, Whittier, Holmes, Lowell, Howells and James. Representative works of the authors named are studied, and an attempt is made to discover the distinctively American element by a comparative study with British authors.—*Second semester.* When this subject is taken for an advanced degree, individual work is assigned for the first semester, upon which the candidate is expected to make weekly reports.

### Principles of Criticism.

Lectures. Candidates who take their major in English Literature are expected to take this course in connection with the seminary work in English Literature and Shakespeare.—*Throughout the year.*

Professor HEMPL:—

### Old-English\* Syntax.

The investigation of specific problems, together with a brief general survey of the subject.—*First semester.*

### Old-English Phonology and Morphology.

A study of early West-Saxon prose, with special reference to sounds and inflection.—*Second semester.*

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\*The term "Old English" is used in this Announcement for the period of English often called "Anglo-Saxon."

### Historical English Grammar.

A general survey of the subject, and the investigation of the origin and development of impugned Modern-English idioms.—*First semester.*

### Old-English Poetry.

A study of early English literature, with special reference to the political monuments.—*Second semester.*

### Spoken English.

A study of colloquial English as distinguished from the English of books and of formal speech, and the investigation of the more important facts as to the fortunes of English speech in this country.—*Second semester.*

Students prepared to do advanced work in Old English may take the courses in Old-English syntax and in Old-English phonology and morphology. At the same time with the syntax, the general subject of historical English Grammar may be taken up, to be followed by the study of the modern spoken language; but students who desire to make a study of early English Literature will take instead the work in Old-English poetry, to be accompanied, at their choice, by the undergraduate course in Transitional and Early Middle English. Students not yet prepared to do advanced work in Old English will omit or defer the course in Old-English syntax, and will begin the subject with the undergraduates, preparing themselves for the two Old-English courses offered in the second semester.

Assistant Professor SCOTT:—

### Development of Rhetorical Theory.

A historical and comparative study of the growth of rhetorical theory from Aristotle to the present time.—*Throughout the year.*

Professor TRUEBLOOD:—

### Study of Great Orators, ancient and modern.

Lectures on methods of public address and sources of power. Study of representative selections. The method is similar to that in the English Literature Seminary.—*Throughout the year.*

### Oral Discussions.

This course is designed to develop readiness of extemporization. It involves the application of the principles of formal logic and elocution in the discussion of leading topics of the day. Students are required to present briefs of the subjects discussed.—*Second semester.*

## HISTORY.

The graduate work described below presupposes such information and training as is represented by undergraduate Courses 1, 2, and 3 (see University Calendar for 1894-95, page 68), supplemented by one or more advanced undergraduate courses. In indicating the courses named below as adapted to the needs of graduate students, it is not intended to exclude other advanced undergraduate courses, especially those in English constitutional history, in mediæval history, and in American colonial history, which, in certain cases, graduate students will be asked to take.

A large part of the work of the graduate student will consist of individual research and investigation carried on under the personal supervision of the professor in charge. To insure such supervision two seminaries have been organized exclusively for graduates. The work of these seminaries has been so arranged that the same student may remain a member of the seminary for two or more years. In the library building are seminary rooms in which graduate students may carry on their work. In these rooms is shelved the Hagerman collection of books on history and political science, including many works to which the student has frequent occasion to refer. As occasion requires, books in special lines are placed in the seminary rooms for the use of advanced students, and everything is done to make the library serve the purpose of research.

Professor HUDSON:—

The History of Europe since 1789.

The French Revolution and the Empire of Napoleon are dealt with in the *first semester*. In the *second semester* a study is made of the national movement of the present century, and of the condition, relations, and policy of the leading European states.

Political Institutions.

In this subject the three following courses are given in addition to the courses mentioned below in the constitutional law of the United States:

(a) Comparative constitutional law. A course of lectures dealing in the *first semester* with English institutions, and in the *second semester* with those of Germany, Switzerland, France, and Italy.

(b) Seminary for the study of municipal government. In this course a study of the municipal systems of England, France, and Germany, prepares the way for the study of American municipalities and their problems.

(c) Graduate seminary. The history of political institutions and of political ideas since the time of the Greeks. Occasional lectures will be given to direct and to sum up the work of the students.

Professor McLAUGHLIN:—

The Political and Constitutional History of the United States, 1776-1861.

The purpose of this course is the careful study of the origin of the Constitution, its interpretation in history, the development of our political system, and the growth and tendencies of political parties. The work is based upon lectures and the careful examination of prescribed texts. The student is expected also to read in the library and to form a wide acquaintance with the secondary, and with some of the primary, authorities. Weekly reports on the reading are required. Those who have not had a thorough course in colonial history will find it desirable to take undergraduate Course 13 (University Calendar for 1894-95, page 69) in connection with this course.—*Three times a week, throughout the year.*

Seminary in American History.

The aim of the seminary is to guide and direct the student in the use of primary authorities and to give instruction in methods of research. Special subjects of investigation are assigned to members of the seminary, and regular reports are made. Students at work upon theses are expected to report difficulties and successes, and are guided in their work. During a portion of the year the more important constitutional questions of the rebellion and the period of reconstruction are discussed, and there is an examination of the leading documents of this period.—*Two hours a week, throughout the year.*

Constitutional Law and Political Institutions of the United States.

In this course there is a consideration of the Constitution as it has been interpreted by the courts, and a study of our political system as it appears in action. Graduate students electing this work will be expected to read important texts, to examine leading cases, and to report on problems in politics and administration.—*Three times a week, for one semester.*

In addition to following the three courses just described, graduate students will meet periodically to make reports on current literature, to discuss new books, and to examine important political questions or decisions of the courts.

PHILOSOPHY.

The advanced courses described below presuppose instruction in logic, ethics, and general psychology; also a general introduction to philosophy and a somewhat extended study of the history of philosophy, ancient,

mediæval, and modern. Candidates for a higher degree who have not had a preparation equivalent to this will be expected to take certain of the lower courses; either before entering upon, or in connection with, their graduate work. Advanced courses bearing upon the history of philosophy are also given in the departments of Greek, Latin, French, and German. The courses in mathematics are strongly recommended for students specializing in philosophy.

#### A. HISTORY OF PHILOSOPHY.

Assistant Professor LLOYD:—

##### The History of Philosophy.

A general outline of the subject from Thales to the present century. The course is designed to state the development of philosophical problems and concepts, and thus to give the student his bearings in philosophy. It is therefore highly advisable, if this course has not been taken before beginning graduate work, that it be taken at once upon beginning it.—*Three hours a week, throughout the year.*

##### Supplementary work in the History of Philosophy.

The object of this course is to introduce the student to the methods of investigation and discussion in the subject. Some special points of the general course are taken up and given more detailed consideration.—*One hour a week, throughout the year.*

##### The Philosophy of Kant.

Lectures, and study of the Critique of Pure Reason.—*Two hours a week, first semester.*

##### Special Study in Kant.

For the more detailed study of special points than the preceding course affords.—*One hour a week, first semester.*

##### The Philosophy of Spinoza.

[Elwee's translation. Lectures, and study of the ethics.—*Two hours a week, second semester.* This course is omitted in 1895-96, but may be expected in 1896-97.]

##### [Special Study in Spinoza.

For the more detailed study of special points than the preceding course affords.—*One hour a week, second semester.* This course is omitted in 1895-96, but may be expected in 1896-97.]

### The Philosophy of Hegel.

Lectures, and study of the Logic.—*Two or three hours a week, the third hour for special study and preparation of a thesis, second semester.*

Mr. REBEC:—

### Plato's Republic.

Reading of the Republic, and study of its connections with other dialogues, with Socrates, Aristotle, etc. Theses required.—*Two hours a week, second semester.*

### B. PSYCHOLOGY.

The psychological laboratory is well equipped with apparatus for original investigation.

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### Special studies in Psychological Theory.

Readings, discussions, and theses.—*One hour a week, throughout the year.*

### Demonstration Course in Experimental Psychology.

*Two hours a week, each semester.*

### Research Course in Experimental Psychology.

*Throughout the year.*

### C. ETHICS AND PHILOSOPHY OF ECONOMICS.

Assistant Professor LLOYD:—

### Special Studies in Ethics.

Reading, discussion, and theses.—*One hour a week, second semester.*

### [History of British Ethics from Hobbes to Mill.

A study of the development of ethical ideas and problems in Great Britain. Special attention is given to the reflection of English political and industrial life in its ethical theory.—*Two hours a week, first semester.* This course is omitted in 1895-96, but may be expected in 1896-97.]

### Philosophy and Political Economy.

Historical relations of philosophy and political economy.—*Two hours a week, first semester.*



Mr. REBEC:—

### History of Ancient Ethical Theories.

A study of ethics in ancient philosophy. Lectures and assigned readings.—*Two hours a week, first semester.*

### D. AESTHETICS AND PHILOSOPHY OF RELIGION.

Mr. REBEC:—

#### Aesthetics.

Historical review of leading aesthetical theories and their connection with philosophic systems.—*Two hours a week, first semester.*

#### The Relation of Rhetoric to Philosophy.

A brief historical summary of the influence of philosophic doctrines on rhetorical conceptions, together with an attempt to trace in outline the psychological, ethical, aesthetical, and logical elements involved in expression.—*Two hours a week, second semester.*

Assistant Professor LLOYD:—

#### The Philosophy of Religion.

Lectures and assigned readings.—*Two hours a week, second semester.*

### THE SCIENCE AND THE ART OF TEACHING.

Three courses constitute the foundation of the work in this department. Course one, four hours a week for one semester, is a practical course, dealing with methods of instruction, general school-room practice, school hygiene, and school law. Course two, also four hours a week for one semester, theoretical and critical, deals with the principles underlying teaching and government, as deduced from the facts of human nature, physical, mental, and moral, and the educational values or uses of studies. Course three, three hours a week for one semester, devoted to school supervision, deals especially with the duties of superintendents and principals, including the arts of constructing courses of study and grading schools, and conducting examinations, teachers' meetings, institutes, etc. These courses are open to students seeking advanced degrees, and are sometimes pursued by them with interest and advantage. Such students are strongly advised to take course two, at least, if they have never studied the science of teaching, provided they intend to follow the art of teaching. As the three courses are strictly professional, lying wholly outside of the field of general study, there is manifest reason in recommending them to graduate students, although elementary.

Graduate students who have had this more elementary instruction, should choose their work among the more advanced courses of the

department, given below. These courses are supplemented by private reading done under the direction of the professor, as far as necessary. These more advanced courses may also be profitably pursued by students who have not done the elementary work, although some previous practical or theoretical acquaintance with that work is desirable. Students who do not intend to become practical teachers, but who elect work in this department for its culture value, are, as a rule, advised to make choice of educational history, or of that subject combined with the science of teaching. It may be added that, while the primary aim of the department is to assist students seeking to fit themselves for the work of teaching, the general culture value of the several courses is kept constantly in mind. Nothing need be said about the doctor's degree specially, except that private study will be assigned to the candidate according to the nature of the work.

**Professor HINSDALE:—**

**History of Education: ancient and mediæval.**

Recitations and lectures. Text-book: Compayré's History of Pedagogy. The subjects treated in the lectures given in this course are oriental, Greek, and Roman education, and the rise and early development of Christian schools.—*Three hours a week, first semester.*

**History of Education: modern.**

Recitations and lectures. Text-book: Compayré's History of Pedagogy. The topics dealt with in this course of lectures are the movements of modern educational thought and practice.—*Three hours a week, second semester.*

**The Comparative Study of Contemporary Educational Systems: domestic and foreign.**

Besides a general survey of the institutional organization of education in the United States, similar surveys are made of several foreign countries, as Germany, Italy, France, and England. Lectures.—*Two hours a week, second semester.*

**Seminary.**

Study and discussion of special topics in the history and philosophy of education. Subject for the year 1895-96: Studies in the Herbartian psychology and pedagogy. Only advanced students will be admitted.—*Two hours a week, second semester.*

**POLITICAL ECONOMY AND SOCIOLOGY.**

The strictly undergraduate courses in political economy represent the work of at least one academic year. These courses cover "Elements of

Political Economy" and "Problems in Political Economy." For description see the University Calendar for 1894-95, pages 74 and 75.

Of the courses enumerated below, those designated as "Intermediate Courses" are open to undergraduate as well as to graduate students, but special instruction of one hour a week will be afforded all graduate students in connection with each course, this "extra hour" being devoted to a more careful analysis and a more extended discussion than is possible in the lectures. The courses designated as "Graduate Courses" are open only to graduate students, or to undergraduates making a specialty of political economy.

#### A. INTERMEDIATE COURSES.

Professor ADAMS:—

##### History of the Development of Industrial Society.

This course embraces a history of English industrial society from the twelfth century to the present time, and is designed to show how modern industrial customs and rights came into existence. As classified in the curriculum of the University of Michigan, it is regarded as introductory to all courses in political economy, and is usually taken before a study of the "Elements." It is inserted here because all advanced students do special reading upon industrial history.—*Two hours a week, first semester.*

##### Principles of the Science of Finance.

Under the science of finance will be included a discussion of principles of public expenditure, budgetary legislation, financial administration, public industries, and public debts. Mr. ORTON will assist Professor ADAMS in this course.—*Two hours a week, second semester.*

##### Transportation Problem.

This course traces the history of transportation as an industry, shows the social, industrial, and political results of modern methods of transportation, presents an analysis of the railway problem, and discusses the various solutions proposed.—*Two hours a week, second semester.* An "extra hour" is given in connection with this course under the direction of Dr. COOLEY.

Professor F. M. TAYLOR:—

##### History of Political Economy.

This course consists of assigned readings in political economy in connection with a study of Ingram's History of Political Economy. It is important that students who desire to specialize in economics should take this course.

## Industrial History of the United States.

This course includes an account of the general course of industrial development, brief sketches of the leading industries, and a history of crises, the tariff, labor movements, etc. The later part of the course will be given especially to recent industrial institutions, such as trusts, stock and produce exchanges, special forms of insurance, etc.—*Two hours a week, first semester.*

## Money and Banking.

A mixed text-book and lecture course. The class will be examined in Jevons's *Money and the Mechanism of Exchange*, Upton's *Money in Politics*, and Dunbar's *Theory and History of Banking*, as well as upon the lectures. Current monetary problems will receive especial attention.—*Two hours a week, first semester.*

## Socialism, including Communism, Collectivism, Land Nationalization, State Socialism, etc.

*Two hours a week, first semester.*

Dr. COOLEY:—

## Theory of Statistics.

The earlier part of this course consists of lectures. Later, practical exercises are introduced, and during the second semester the student is expected to undertake work having in some measure the character of independent research.—*One hour a week, throughout the year.*

## Special Studies in Statistics.

*Two hours a week, second semester.*

## Principles of Sociology.

Lectures. This course aims at a systematic and comprehensive study of the underlying principles of social science. It embraces a brief historical review of the development of institutions, but is chiefly concerned with an analysis of existing society.—*Three hours a week, first semester.*

## Problems in Sociology.

This course embraces a study of the treatment of criminals, poor-relief, the assimilation of immigrants, the development of great cities, and other sociological questions of present importance.—*Three hours a week, second semester.*

### Advanced Course in Sociology.

This course will be devoted to a special study of sociological problems, and will consist of assigned readings and reports.—*Two hours a week, second semester.*

### B. GRADUATE COURSES.

The strictly advanced instruction in economics and sociology is carried on partly by lectures, partly by assigned readings and reports, and partly by formal seminaries designed to give practice in research. So far as lectures are concerned, it is organized as a solid course of three hours a week for three consecutive years. The course is given jointly by Professor ADAMS, Professor F. M. TAYLOR, and Dr. COOLEY, each instructor in turn claiming the attention of students for six consecutive weeks each semester. The subjects of instruction in each case are as indicated below.

Since the chief aim of advanced instruction is to familiarize students with the process of critical analysis, the particular topics investigated during any semester are relatively unimportant. In view, however, of the fact that the most advanced degree conferred by the University calls for three years of study, it seems necessary that the special topics should be changed each year for a series of three years. As a result of this arrangement candidates for a bachelor's degree (who are adequately prepared) are provided with one year, candidates for a master's degree with two years, and candidates for a doctor's degree with three years of specialized instruction. It will be noticed from the analysis given below that the topics covered in this specialized course have been somewhat cursorily treated in the "intermediate" or general University courses.

Professor Adams:—

#### Development and Significance of the Austrian School of Economy.

*Three hours a week, for six weeks, first semester.* This course will be omitted in 1896-98.

#### Relation of the State to Industrial Action.

*Three hours a week, for six weeks, second semester.* This course will be omitted in 1896-98.

#### [Development and Significance of English Political Economy.

*Three hours a week, for six weeks, first semester.* This course is omitted in 1895-96, but may be expected in 1896-97.]

[Comparative Study of Fiscal Institutions.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1895-96, but may be expected in 1896-97.]

[Development and Significance of the Historical School of Economics.

*Three hours a week, for six weeks, first semester.* This course is omitted in 1895-96, but may be expected in 1897-98.]

[Labor Organizations and Corporations as Factors in Industrial Organization.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1895-96, but may be expected in 1897-98.]

Professor F. M. Taylor:—

The Standard of Value.

Different schemes historically and critically examined.—*Ten lectures, first semester.* This course will be omitted in 1897-98.

Credit as a Factor in Production.

The modern institutions of credit historically and theoretically considered.—*Three hours a week, for six weeks, second semester.* This course will be omitted in 1896-98.

[The Value of Money.

Theory and statistics.—*Three hours a week, for six weeks, first semester.* This course is omitted in 1895-96, but may be expected in 1896-97.]

[The Agricultural Problem.

Treated from the comparative point of view.—*Three hours a week, for six weeks, second semester.* This course is omitted in 1895-96, but may be expected in 1896-97.]

[Paper Money.

Government *versus* bank notes. Methods of regulation.—*Ten lectures, first semester.* This course is omitted in 1895-96, but may be expected in 1897-98.]

[Social Philosophy, with Especial Reference to Economic Problems.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1895-96, but may be expected in 1897-98.]

Dr. COOLEY:—

### Historical Development of Sociological Thought.

*Three hours a week, for six weeks, first semester.* This course will be omitted in 1896-98.

### Town and Country.

A study of the distribution of population, including the origin, function, and growth of towns and cities, and the relation of population to physical geography.—*Three hours a week, for six weeks, second semester.* This course will be omitted in 1896-98.

### [Relation of Sociology to other Branches of Research.

*Three hours a week, for six weeks, first semester.* This course is omitted in 1895-96, but may be expected in 1896-97.]

### [Current Changes in the Social Organization of the United States.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1895-96, but may be expected in 1896-97.]

### [Aims and Methods in the Study of Society.

*Three hours a week, for six weeks, first semester.* This course is omitted in 1895-96, but may be expected in 1897-98.]

### [The Theory of Population.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1895-96, but may be expected in 1897-98.]

## INTERNATIONAL LAW.

The courses in international law presuppose a general acquaintance with modern European history.

President ANGELL:—

### Lectures on International Law.

*Two hours a week, first semester.*

### History of Treaties.

*Two hours a week, second semester.*

## MUSIC.

Courses are given in the University, but not here enumerated, that provide instruction in the science and practice of choral music, the science of harmony, and simple and double counterpoint. The courses named below are intended for graduate students.

## Professor STANLEY:—

## Canon and Fugue.

*Two hours a week, throughout the year.*

## Musical Form.

*Two hours a week, throughout the year.*

## Free Composition.

*Two hours a week, throughout the year.*

## Instrumentation.

*Two hours a week, throughout the year.*

Original work in research will be required of candidates for a doctor's degree, who take music as one of their subjects.

## MATHEMATICS.

The courses mentioned below presuppose the usual preparatory course in algebra and elementary geometry, plane, solid, and spherical, together with two years of collegiate study devoted to trigonometry, higher algebra, plane analytic geometry, and differential and integral calculus.

## A. PRIMARILY FOR GRADUATES.

## Professor BEMAN:—

## Solid Analytic Geometry.

*Frost, with references to Salmon.—Two hours a week, second semester.*

## Differential Equations.

*Forsyth, with references to Johnson, Boole, and Mansion.—Three hours a week, first semester, two hours a week, second semester.*

## Mathematical Reading.

This course is designed to give graduate students an opportunity to read standard mathematical works under the direction of the faculty. Jordan's *Cours d'Analyse* was read in 1894-95.—*Three hours a week, throughout the year.*

## Assistant Professor ZIWET:—

## Advanced Mechanics.

This course is designed for students who have taken a preliminary course in mechanics involving the elementary applications of the calculus. The first part of the course is mainly devoted to the theory



of the potential and its applications; the second to rigid dynamics.—  
*Two hours a week, first semester; three hours a week, second semester.*

Mr. GLOVER:—

### Theory of Complex Numbers.

This course leads to the theory of the elliptic and other transcendental functions. Its subject matter is the logical development of the conception of the complex (imaginary) quantities, and the consideration of the properties of functions of a complex variable.—  
*Three hours a week, first semester; two hours a week, second semester.*

### B. FOR GRADUATES AND UNDERGRADUATES.

Professor BEMAN:—

### Solid Analytic Geometry.

Frost, with references to Salmon.—*Two hours a week, first semester.*

### Quaternions.

Hardy, with references to Tait and Hamilton.—*Three hours a week, second semester.*

### Teachers' Seminary.

Critical study of certain text-books in algebra and geometry, together with the discussion of methods and aims in mathematical teaching, sketches of the history of mathematics, list of books for teachers, etc.—*Two hours a week, throughout the year.*

Assistant Professor MARKLEY:\*—

### Modern Higher Algebra.

This course is based on Burnside and Panton's Theory of Equations.—*Three hours a week, second semester.*

### Fourier's Series, and Spherical, Cylindrical, and Ellipsoidal Harmonics.

This course is based on Byerly's treatise.—*Two hours a week, throughout the year.*

Mr. GLOVER:—

### Projective Geometry.

This course is devoted to a systematic treatment of the elements of modern coördinate geometry as a basis for the theory of higher curves

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\*Assistant Professor MARKLEY has leave of absence for the year 1895-96, but provision will be made for the courses offered by him.

and of surfaces on the one hand, and of invariants on the other.—  
*Three hours a week, throughout the year.*

### PHYSICS AND ELECTRICAL ENGINEERING.

The courses here announced presuppose about one and a half years' collegiate work in physics; viz., a course in mechanics, sound, light, electricity, magnetism, and heat, five hours a week, for one year; a beginners' course in laboratory work, two or three hours a week for half a year; and a course in primary and secondary batteries, two hours a week for half a year.

The courses in Mathematical Electricity (Mascart and Joubert), the Theory of Light (Preston), and the Theory of Heat (Preston), are primarily for graduates; the other courses are open to undergraduates, but they are found to be beyond the work done in many colleges.

Graduate students, who are properly qualified by their previous training, have opportunity for original research in the physical laboratory under the immediate supervision of the director and his associates.

Professor CARHART:—

Dynamo Electric Machinery.

*Three hours a week, second semester.*

The Alternate Current Transformer: Fleming.

*Two hours a week, first semester.*

The Theory of Heat: Preston.

*Two hours a week, first semester.*

Professor CARHART, Assistant Professor PATTERSON, and  
 Dr. GUTHE:—

Electrical Measurements.

*Lectures, two hours a week, laboratory work, three times a week, first semester.*

Assistant Professor PATTERSON:—

Mathematical Electricity: Mascart and Joubert.

*Three hours a week, first semester; two hours a week, second semester.*

Advanced Work in Photometry.

*One (or two) hours a week, second semester.*

Assistant Professor REED:—

The Theory of Light: Preston.

Lectures and recitations, *two hours a week*; laboratory work, *twice a week, second semester*.

Dr. GUTHE:—

Advanced Laboratory Work in Electricity and Magnetism.

*Twice a week, second semester.*

The Theory of Potential and its Applications.

*Twice a week, second semester.*

GENERAL CHEMISTRY.

The courses here announced presuppose about two years' collegiate study of general, analytical, and organic chemistry, comprising both theoretical instruction and laboratory practice. The laboratory research courses are intended primarily for graduate students. The lecture courses are for graduates and advanced undergraduates, but graduates taking these courses will receive additional special instruction of one hour a week. Students taking general chemistry as a major study are required to have a reading knowledge of German and French, and to be well grounded in general, analytical, and organic chemistry.

Professor FREER:—

Theoretical Chemistry of Recent Years.

Lectures; historical readings; laboratory work in the methods of determining molecular weights.—Lectures, *two hours a week*, laboratory work, *two hours a week, first semester*.

Chemical Literature; Journal Club.

The Journal Club will be under the direction of Professor FREER, but all the instructors in the department of general chemistry will take part therein.—*One hour a week, second semester*.

Laboratory Research.

The work may be in organic or in inorganic chemistry. Students taking the work must have a good knowledge of organic preparations.—*Hours arranged with instructor, throughout the year*.

Mr. HIGLEY:—

The Rarer Chemical Elements.

Lectures, *two hours a week*, laboratory work, *one hour a week, second semester*.

### Laboratory Research in Selected Topics in Inorganic Chemistry.

*Hours arranged with instructor, throughout the year.*

### Laboratory Work in Inorganic Preparations.

*Hours arranged with instructor.*

Mr. LICHTY:—

### Laboratory Work.

Methods of determining molecular weights, and other problems involving the specific gravity of gases.—*Two hours a week, second semester.*

### Laboratory Research, inorganic or organic.

*Hours arranged with instructor.*

## ORGANIC CHEMISTRY AND ANALYTICAL CHEMISTRY.

The necessary preparation for the several graduate courses in these subjects is stated separately for each course below. For full graduate studies in analytical or organic chemistry each application is judged upon its individual merits, in view of the nature of the studies desired and the collateral qualifications of the applicant. In every case the student must have made himself competent for trustworthy determinations in the laboratory, and should have begun to use chemical literature in its original sources. The courses of study in these subjects, arranged on the credit system, as given in the University Calendar\*, number thirty-one, of which eight provide for research. The required preparation for graduate studies is subject to variation according to the relation these may have to the aims of the student. From twenty-one to forty-two hours of credit in chemistry, general, analytical, and organic, if the work be well directed to the end in view, may be made to suffice, according to the aims of the student, to prepare him for graduate studies in organic and analytical chemistry. Graduates of other colleges who have carried chemical studies with laboratory work through two years are in many cases found prepared to take up graduate courses here at once. Candidates for a higher degree who take chemistry as a major study are expected to engage in original studies, both in the laboratory and in the library. Any student can do creditable work in a research, under direction, if he have sufficient preparation and exercise faithful

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\* Details in regard to the undergraduate courses are given in the University Calendar for 1894—95, pages 83 to 86. An "hour of credit" implies the satisfactory completion of work equivalent to one exercise a week during one semester.

industry. In the research course, it is usually made a part of the student's work to prepare his report in literary form adapted for publication in a chemical periodical. In laboratory work, hours can be arranged between 8 A. M. and 6 P. M.

Professor PRESCOTT:—

### Organic Synthesis and Ultimate Analysis.

Open to those who are prepared in general chemistry, primary organic chemistry, qualitative and quantitative analysis, and the initial organic preparations. Laboratory work, with reading by subjects in the library. The laboratory work may be taken mainly in synthetic preparations or mainly in organic combustions. If mainly in the combustion work, it may well be accompanied by molecular weight determinations in the laboratory of general chemistry. If mainly in synthesis, it is accompanied by the indexing of chemical literature in the library, following well-defined lines of synthetic production, with reports, in a seminary class, upon both literature and experimentation. The synthetic studies especially lead to original research, and are continued as such in another year's course.—*Hours arranged with instructor, throughout the year.*

### Analytical Organic Chemistry.

Open to those who are prepared in general chemistry, qualitative and quantitative analysis, primary organic chemistry, and proximate organic analysis equivalent to undergraduate Course 14. Laboratory work with research in the library. Qualitative and quantitative work with the alkaloids, the fats, the recovery of poisons, and methods of chemical estimation of the purity of waters. In the determination of organic compounds, chemical methods are mostly employed, but these are conjoined with optical methods by use of the polariscope, spectroscope, and refractometer, as well as by microscopic examinations. The student elects some one branch of the work provided for in this course, as, for instance, the alkaloids, and devotes himself to experimentation in this branch and to its bibliography, reporting his progress from time to time in the seminary. Before the close of the course the work becomes original investigation.—*Hours arranged with instructor, throughout the year.*

### Investigation in Organic Chemistry.

The general chemical preparation for research is that required for one of the two courses above named. Besides this some special preparation, such as can be obtained in one of the above named courses, is usually necessary. Critical bibliography is classed as research, but it must be accompanied by laboratory investigation unless the student

has experience in the latter. Any subject in organic chemistry, synthetic or analytic in its aim, and within the range of inquiry in this laboratory, may be agreed upon. The constitution of the compounds of the alkaloids is under investigation at present. The student is expected to gather from chemical literature the substance of a full history of his subject, usually preparing some form of bibliography. In the seminary class the student reports his results and his plans, from time to time, when there is a critical discussion of his report.—*Hours arranged with instructor, throughout the year.*

Professor JOHNSON:—

### Qualitative Analytical Chemistry.

Open to those well prepared in qualitative analysis, and in a beginning course in quantitative analysis, in addition to a course in general chemistry. The applicant must be able to pass examination in Courses 1 and 4 of the undergraduate studies, or their equivalent. The work consists in an advanced study of qualitative methods and reactions, with a search of the original literature. Lectures, *two hours a week*, laboratory work, *hours arranged with instructor, second semester.*

### Investigations in Inorganic Reactions and Qualitative Methods.

Open to those who have completed the course last named, or, being prepared to enter that course, have also such special preparation as the desired research demands. The subject of a student's research may be selected in any range of inorganic reactions, such as studies of oxidation and reduction, comparative methods of separation, limits of qualitative recovery, and the composition of products in analysis. The facts of oxidation, in its successive degrees, are especially under experimental inquiry.—*Hours arranged with instructor, either first or second semester, or, preferably, both semesters.*

Professor CAMPBELL:—

### Quantitative Analytical Chemistry.

Open to those prepared in quantitative analysis, who have had the beginning course in quantitative work, equivalent to Course 4 of undergraduate studies, in addition to a study of general chemistry. Laboratory work and library reading. The work consists of general advanced quantitative analysis with specialization in the direction of the aims of the student.—*Hours arranged with instructor, first or second semester, or both semesters.*

## Investigations in Metallurgical Chemistry and Quantitative Methods.

Open to those who have completed the course last named, or have had an equal amount of training which should be applicable to the research desired. The undergraduate Courses 6 and 7 are advantageous in preparation for this research. The subject of the research may be taken from any part of quantitative work, to fill out deficiencies in analytical science. Work has been done for the improvement of methods for the analysis of several metals of manufacture. It is the special undertaking in this laboratory to make advances in the proximate analysis of iron and steel, and other metals, that is, to determine the actual chemical union of the elements existing in metals as manufactured. This has been undertaken for carbon in iron and steel, the research having for its object the determination, if possible, of the form or forms in which the carbon occurs, and the influence of the several forms upon the physical properties of the metal. The work is conducted, first, by chemical study of the solid carbon derivatives; second, by microscopic study of the structure as varied by heat-treatment; and third, by chemical study of gaseous products of solution. Critical bibliography is carried along with laboratory determinations, as means of research.—*Hours arranged with instructor, throughout the year.*

## HYGIENE AND PHYSIOLOGICAL CHEMISTRY.

The courses here announced presuppose that the student taking them is prepared for original research.

Professor VAUGHAN:—

### Original Research on the Causation of Disease.

*Hours arranged with instructor, either first or second semester.*

Professor NOVY:—

### Advanced Physiological Chemistry.

Laboratory work and reading.—*Hours arranged with instructor, either first or second semester.*

## ASTRONOMY.

The courses here announced presuppose acquaintance with general astronomy, analytic geometry, and calculus. For the first two courses some knowledge of mechanics is also required.

Professor Hall:—

Theoretical Astronomy.

Computation of orbits, correction of approximate elements, and theory of special perturbations.—*Five hours a week, throughout the year.*

Mathematical Theory of Planetary Motion.

Elementary treatment of general perturbations.—*Two hours a week, first semester.*

Professor HALL and Mr. TOWNLEY:—

Extended Practical Course in the Use of Instruments.

*Hours (at the observatory) arranged with instructors, first semester.*

Mr. TOWNLEY:—

Method of Least Squares and Empirical Curves.

*Two hours a week, first semester.*

Spherical Astronomy.

*Three hours a week, throughout the year.*

MINERALOGY.

The higher work in mineralogy presupposes an elementary knowledge of chemistry and an introductory course in mineralogy, combining theoretical instruction with practice in determining minerals. The work will be directed by Professor PETTEE.

GEOLOGY.

The course of instruction in geology for undergraduates, as announced in the University Calendar for 1894-95, pages 88, 89, embraces two years. The first year is devoted to elementary studies in physical geology and historical geology, giving three hours a week to each for one semester. Le Conte's Elements of Geology is used, supplemented by lectures and exhibitions of specimens, maps, etc. During the second year more detailed instruction is given, two hours each week, in the same general subjects. Green's Physical Geology is used for reference during the first semester, supplemented by lectures and laboratory work. Each student is given a special subject for investigation in connection with which a thesis of about 2500 words is required. During the second semester palæontological studies are carried on with the aid of various treatises and laboratory work. A special subject is assigned each student and a short thesis is required.



Students in the graduate school may enter either of the advanced courses mentioned above, providing studies equivalent to the elementary course have been pursued. Those who have done more work than is represented by the elementary course may make special arrangements for instruction and assistance in various lines of study, dependent on their tastes and acquirements. In a general course the current literature of geology will be read with special reference to Pleistocene geology, and to the origin and classification of topographic forms, glacial records, lake histories, erosion, and all of the processes by which the surface of the earth has come to have its present form.

The geological museum is being rearranged and a series of fossils selected to illustrate the life history of North America. This collection is intended especially for the use of students in the elementary courses, but may be consulted by advanced students as well. The specimens will be exhibited in the lecture room as required, and after lectures will be returned to the cases in the museum where they will be available for examination at any time.

There is a second collection embracing some ten thousand specimens of both American and European fossils, which is arranged zoologically and intended for the use of advanced students in palæontology. Special collections of rocks, brachiopods, corals, etc., numbering from one hundred and fifty to two hundred specimens each are arranged in the geological laboratory for the immediate use of students.

The collection in physical geology is small, but efforts are being made for its enlargement, and ample material will be on hand to illustrate lectures in this department. Students bringing private collections will be given an opportunity to arrange them in cases provided for the purpose, and facilities for consulting original monographs, and making comparison with specimens in the museum.

The geological laboratory is provided with apparatus for preparing thin sections of fossils and rocks, and with microscopes and photographic instruments. The laboratory is open to students from nine until five each day throughout the collegiate year.

The work in geology will be conducted by, or under the direction of, Professor RUSSELL.

#### SYSTEMATIC ZOOLOGY.

The courses here announced presuppose one year's work in general biology.

Assistant Professor WORCESTER:—

The Evolution of Species and their Geographical Distribution.

Illustrated lectures.—*Three hours a week, throughout the year.*

### Study of Special Groups.

Graduate students who satisfy the instructor of their fitness to pursue the work, will be given opportunity to carry on the systematic study of special groups represented in the University Museum.—

*Hours arranged with instructor.*

Dr. LILLIE:—

### Field Club Work.

Field excursions and laboratory work, with occasional lectures. Collection, identification, preservation, and study of specimens of the local fauna.—*Three hours a week, throughout the year.*

### ANIMAL MORPHOLOGY.

The courses here announced presuppose a year's work in general biology, such as is carried on in this University conjointly by the departments of botany and animal morphology. Following the general biology, work is provided in both invertebrate and vertebrate morphology. Candidates for the higher degrees will usually pursue both lines of work, but will find it of advantage to specialize in one of them; they will also be required to have a knowledge of the elements of physics and chemistry and some acquaintance with French and German.

In the laboratory, a description of which is given in the University Calendar for 1894-95, page 29, the student learns methods of dissection, staining, imbedding, section-cutting, graphic and solid reconstruction, and other technical methods of investigation. A library, shelved in the laboratory, contains sets of the important English and foreign periodicals, as well as many monographs, and other separate publications. It contains also an extensive collection of original papers relating to the invertebrate fauna of other fresh waters. The private collections of the instructors in morphology and the library of the Department of Medicine and Surgery, which is rich in the literature of vertebrates, are also accessible to students. The original papers in connection with both lectures and laboratory work are placed in the hands of students, and special reading is required.

Graduate students will often find the elementary work in general biology of value to them, and they can rarely omit, without loss, any of the courses in animal morphology that are open to undergraduates.

A student who selects animal morphology as a *minor* for the *master's degree* may pursue the course in invertebrate morphology, vertebrate comparative anatomy, vertebrate embryology, or histology, but should not attempt to do work in more than one of these subjects. If animal morphology be chosen as a *major*, work may be taken in invertebrate morphology and at the same time in any two of the branches of verte-

brate morphology named above. For any of these branches the student may substitute the preparation of a thesis, and such substitution is advised for those who do not intend to become candidates for the doctor's degree.

The work outlined for those who elect animal morphology as a major for the master's degree is suitable for candidates for the *doctor's degree* who elect this subject as a *minor*.

Those electing animal morphology as a *major* for the *doctor's degree* are expected to complete all the courses offered. During the first part of his term of residence at the University, the candidate should devote his time to these courses and to the completion of work on the minors. In his second year of residence, in addition to completing the work mentioned, he is expected to repeat a designated piece of research work in order to acquaint himself with methods of investigation. At the same time he does assigned reading on the more important problems of morphology and on zoological history and theory. At the least one year must be devoted to the research which is to be embodied in the doctor's dissertation.

To *graduates* who have taken as undergraduates any of the courses specified above or their equivalent, is assigned a corresponding amount of work in reading and in the preparation of a thesis.

Those electing animal morphology as a major, will find it of advantage to select as one minor either botany, physiology, systematic zoology, palæontology, or physiological psychology. Less closely related is work in bacteriology, physiological and organic chemistry, and geology.

#### A. PRIMARILY FOR GRADUATES.

Professor REIGHARD:

##### Current Literature of Animal Morphology.

The instructors and advanced students hold weekly meetings at which reports are made on important current papers, followed by informal discussion. Although the meetings are open to all, the membership is restricted.—*One hour a week, throughout the year.*

##### Original Work in Animal Morphology: invertebrate morphology, and vertebrate comparative anatomy, embryology, and histology.

Definite problems are assigned and worked out under the constant supervision of the instructor. The locality affords exceptional advantages for work on vertebrate embryology (Petromyzon, several Teleosts, Amia, Acipenser, Amblystoma, and other forms are under control) and for faunistic or experimental studies on invertebrates. Students intending to begin this work should confer with the professor

in charge as early as the preceding spring in order that they may have time in which to prepare necessary material.—*Hours arranged with instructor, throughout the year.*

Assistant Professor HUBER:—

### Microscopic Anatomy of the Brain and Special Sense Organs.

This course presupposes a knowledge of mammalian (or human) anatomy, including dissection. It must be preceded or accompanied by a course in microscopic technique. Work in vertebrate embryology, though not indispensable, is advised. *Five hours a week, first or second semester.*

#### B. FOR GRADUATES AND UNDERGRADUATES.

Professor REIGHARD:—

### The Comparative Embryology and Anatomy of Vertebrates.

The work in embryology, which precedes the anatomy, begins with a study of the early stages of fishes and amphibia and concludes with detailed work on the chick and the rabbit. In anatomy a few type forms are dissected and preparations of other forms are studied. The lectures are illustrated by charts and preparations especially designed for the purposes of this course.—*Five hours a week, throughout the year.*

This work may be advantageously preceded by the undergraduate courses in mammalian anatomy and histology (Courses 4, 5, 6, and 7, University Calendar for 1894-95, pages 90, 91), though these courses are not required.

Dr. LILLIE:—

### Invertebrate Morphology.

The lectures treat of the comparative anatomy and ontogeny of invertebrates. The laboratory work includes a series of forms which supplements that studied in the course in general biology. Students are required to prepare and deliver lectures on assigned topics.—*Three hours a week, throughout the year.*

Mr. LEWIS:—

### Mammalian Anatomy.

Dissection of the cat, with class-meetings twice a week for quizzes on the anatomy of the cat and for such lectures as may be necessary. It is the purpose of the course to afford a training in mammalian

anatomy which shall be substantially equivalent to the training which the medical student receives in human anatomy. This training gives that mastery of anatomical facts and that knowledge of anatomical technique, which are believed to furnish the most satisfactory basis for the study of human or comparative anatomy. The class makes use of type-written copies of a descriptive anatomy of the cat prepared by Professor REIGHARD.—*Five times a week, throughout the year.*

## BOTANY.

### A. PRIMARILY FOR GRADUATES.

Professor SPALDING, Assistant Professor NEWCOMBE, and  
Mr. L. N. JOHNSON.

#### Research.

The laboratory is equipped with facilities for original work in the physiology, embryology, morphology, and classification of both the higher and the lower plants.

### B. FOR GRADUATES AND UNDERGRADUATES.

The equivalent of a full year in the study of botany is required for admission to any of the courses named below, all of which consist largely of laboratory work.

Professor SPALDING:—

#### Morphology and Classification of Fungi.

*Either three hours or five hours a week, first semester.*

#### Morphology and Classification of Phanerogams.

Aside from the laboratory work, there will be lectures and reading directed toward the principles of relationship and classification, the important biological problems with their philosophical bearing, and the development of the science of botany.—*Either three hours or five hours a week, second semester.*

Assistant Professor NEWCOMBE:—

#### Cell Morphology and Physiology.

By the use of the finer laboratory methods this course comprises the study of the more intimate structure and the phenomena displayed by both vegetative and sexual cells.—*Either three hours or five hours a week, first semester.*

#### Vegetable Physiology.

A practical laboratory study of the phenomena of nutrition, growth, and irritability of plants.—*Either three or five hours a week, second semester.*

Mr. L. N. JOHNSON:—

**Cryptogamic Botany.**

A study of fresh water and marine algæ.—*Either three hours or five hours a week, first semester.*

**Cryptogamic Botany.**

An elementary study of fungi, including methods of culture.—*Either three hours or five hours a week, second semester.*

**PHYSIOLOGY.**

The advanced work in physiology presupposes a knowledge of mammalian anatomy, including histology, and the elements of physics and chemistry. The required training is to be got from such courses as 4 and 5 in animal morphology (or courses in descriptive human anatomy and practical anatomy), 1 and 2 in physics, 1, 2, and 4 in general chemistry, and 10 in organic chemistry (described in the University Calendar for 1894-95, pages 79 to 92. Ability to read German is indispensable, and French is desirable; for students taking physiology as a major study for an advanced degree, though in some cases a candidate may be considered qualified to begin his advanced work prior to the completion of these requirements.

Professor LOMBARD:—

**Lectures and Recitations.**

*Five hours a week, throughout the year.*

**Laboratory Course.**

*Three times a week, one-third of a semester.*

**Physiological Experimentation.**

*One hour a week, one semester.*

**Physiological Research and Collateral Reading.**

Arranged to meet the wants of students who take physiology as a major study.

**ENGINEERING.**

The most of the regular instruction provided in the engineering department consists of courses required for the undergraduate degree; but opportunity is also offered graduates to do research work for a second degree. In mechanical engineering the graduate work will include a study of the installation of plants of machinery and a comparison of the results obtained in practice from different systems; measurements of the power and efficiency of secondary machines; testing of steam machinery; and an investigation of hot-air and gas engines, air compressors,

and refrigerating machines, with a view to comparing experimental data with deduction of theory. In marine engineering the instruction will comprise a study of marine steam engines and propelling instruments, the hydraulics of ship-building, details of construction, propulsion by sails and steam engines, and other topics. The courses in electrical engineering are included with physics (page 38). In each case the graduate will receive special advanced instruction suited to his individual needs, and the hours and the amount of work will be arranged with the respective instructors as may seem best.

## Catalogue of Students in 1894-95.\*

### RESIDENT GRADUATES.

| NAME.                                                                                                 | RESIDENCE.                   |
|-------------------------------------------------------------------------------------------------------|------------------------------|
| Charles Wallace Adams, A.B., 1894,<br>Political Economy; American History; European History.          | <i>Ann Arbor.</i>            |
| †Sadie Maria Alley, Ph.B., 1895,<br>Latin; Roman Political Antiquities; Mathematics.                  | <i>Detroit.</i>              |
| Warren Babcock, Jr., B.S., <i>Mich. Agr. Coll.</i> , 1890,                                            | <i>Agricultural College.</i> |
| Archie Ernest Bartlett, A.B., 1894,<br>Greek; Latin; Classical Archæology.                            | <i>Cardington, O.</i>        |
| †Ira Alanson Beddow, Ph.B., 1895,<br>Latin; History; Pedagogy.                                        | <i>Beddow.</i>               |
| † Joseph Brennemann, Jr., Ph.B., 1895,<br>Vertebrate Morphology; Invertebrate Morphology; Physiology. | <i>Peru, Ill.</i>            |
| Lyman James Briggs, B.S., <i>Mich. Agr. Coll.</i> , 1893,                                             | <i>Lacey.</i>                |
| Physics; Mathematics; Mechanics.                                                                      |                              |
| Gertrude Buck, B.S., 1894,<br>Rhetoric; Psychology; English Literature.                               | <i>Kalamazoo.</i>            |
| Lauren Duane Carr, B.S., 1894,                                                                        | <i>Ann Arbor.</i>            |
| George Albert Clark, Ph.B., <i>Hillsdale Coll.</i> , 1887,                                            | <i>Benzonia.</i>             |
| Harry Walter Clark, B.S., 1894,                                                                       | <i>Ann Arbor.</i>            |
| Ida May Clendenin, B.S., <i>Univ. of the State of</i><br><i>Missouri</i> , 1886, M.S., 1893,          | <i>Mexico, Mo.</i>           |
| Phanerogamic Botany; General Botany; Animal Morphology.                                               |                              |
| William Eli Davis, B.S., <i>Mich. Agr. Coll.</i> , 1889,                                              | <i>Wacousta.</i>             |

\*The principal subjects of study pursued by candidates for an advanced degree are indicated under their respective names.

An asterisk (\*) before a student's name indicates that the student is also pursuing studies in the Department of Medicine and Surgery or in the Department of Law.

A dagger (†) indicates that the student was admitted to the Graduate School at the beginning of the second semester, on completion of the requirements for the bachelor's degree indicated in each case, though the degree will not be actually conferred until the end of the year.

- James Henry Dickson, A.B., 1894, *Portland, Ore.*  
 Tobias Diekhoff, A. B., 1893, *Ann Arbor.*  
     German; Gothic; Old English.  
 Frank Haigh Dixon, Ph.B., 1892, *Ann Arbor.*  
     Political Economy; Finance; American History.  
 †Peter William Dykema, B.L., 1895, *Grand Rapids.*  
     French; German; Rhetoric.  
 Edwin Hugh Edwards, B.S., 1892, *Ann Arbor.*  
     Physiological Botany; Fungi; Embryology.  
 Charles Franklin Emerick, A.B., *Wittenberg Coll.*,  
     1889, M.S., *Mich. Agr. Coll.*, 1891, *Ann Arbor.*  
     Political Economy; History; Pedagogy.  
 Rudolph Frederick Flintermann, A.B., 1894, *Detroit.*  
     Organic Chemistry; Quantitative Analysis; Mineralogy.  
 Willard Clark Gore, Ph.B., 1894, *Ann Arbor.*  
     Rhetoric; English Literature; Philosophy.  
 Herbert Jay Goulding, B.S., 1893, *Saginaw, East Side.*  
 †George Depue Hadzsits, A.B., 1895, *Detroit.*  
     Greek; Latin; Music.  
 Jacob George Halaplian, A.B., 1894, *Saginaw, West Side.*  
     Hebrew; Assyrian; Hellenistic Greek.  
 Arthur Graham Hall, B.S., 1887, *Ann Arbor.*  
     Physics; Mechanics; Heat.  
 John Churchill Hammond, B.S., 1894, *South Lyon.*  
     Mathematics; Astronomy; Civil Engineering.  
 Wilbur Olin Hedrick, B.S., *Mich. Agr. Coll.*, 1891, *Agricultural College.*  
     Political Economy; Finance; History.  
 Ellen Clara Hogeboom, B.S., 1877, *Saginaw, West Side.*  
     General Chemistry; Organic Chemistry; Crystallography.  
 W. Wallace Hurd, Ph.B., 1894, *Clio.*  
     Political Economy; European History; American History.  
 Samuel Allen Jeffers, A.B., *Central Wesleyan Coll.*,  
     1892, *New Florence, Mo.*  
     Latin; Psychology; Pedagogy.  
 John Black Johnston, Ph.B., 1893, *Ann Arbor.*  
     Animal Morphology; Physiology; Physiological Psychology.  
 Ella Adelaide Knapp, A.B., *Kalamazoo Coll.*,  
     1888, A.M., 1890, *Kalamazoo.*  
     English Literature; Old English; American History.  
 Barend Herman Kroeze, A.B., 1894, *Grand Rapids.*  
     Hebrew; Political Economy; Philosophy.  
 Elbert Clarence Lane, B.S., *Adrian Coll.*, 1893,  
     A.B., *ibid.*, 1894, *Adrian.*  
     Greek; Latin; Classical Archæology.  
 †Walter Ferguson Lewis, B.S., 1895, *Ann Arbor.*  
     Physics; Mathematics; Chemistry.  
 Daniel Benjamin Luten, B.S., 1894, *Grand Rapids.*  
     Civil Engineering.



- Elmer Adelbert Lyman, A.B., 1886, *Ann Arbor.*  
 Mathematics; Mechanics; Astronomy.
- \*Walter Park Martindale, Ph.B., 1894, *Fulton, Ill.*  
 United States Constitutional History; Political Economy; Comparative Constitutional Law.
- Hubert Berton Mathews, B.S., *South Dakota*  
*Agr. Coll.*, 1892, *Brookings, S. Dak.*
- \*David Porter Mayhew, Ph.B., 1893, *Detroit.*  
 Physiology; Bacteriology; Physiological Chemistry.
- Benjamin Fuller McLouth, B.S., *South Dakota*  
*Agr. Coll.*, 1893, *Brookings, S. Dak.*
- Newton D. Mereness, A.B., 1892, A.M., 1894, *Ann Arbor.*  
 History; Sociology; History of Philosophy.
- Emerson Romeo Miller, Ph.C., 1892, Ph.M., 1893,  
 B.S., 1894, *Ann Arbor.*  
 General Chemistry; Organic Chemistry; Mineralogy.
- Clarence Mortimer Mulholland, Ph.B., *Albion*  
*Coll.*, 1894, *Orion.*  
 United States History; Comparative Constitutional Law; Political Economy.
- Ralph Winthrop Newton, B.S., 1894, *Ann Arbor.*
- Sara Genevieve O'Brien, B.L., 1894, *Ann Arbor.*  
 European History; English Literature; Pedagogy.
- †Alfred Berthier Olsen, M.D., 1894, B.S., 1895, *Battle Creek.*  
 Histology; Bacteriology; Physiological Chemistry.
- William Walter Parker, B.S., *Mich. Agr. Coll.*,  
 1893, *Charlotte.*  
 Organic Chemistry; General Chemistry; Mineralogy.
- Cyrus Clark Pashby, B.S., *Mich. Agr. Coll.*, 1894, *Agricultural College.*
- Stephen Farnum Peckham, A.M., *Brown Univ.*,  
 1870, *Ann Arbor.*  
 Chemistry; Philosophy; Lithology.
- \*Stuart Hoffman Perry, A.B., 1894, *Pontiac.*  
 American History; European History; Philosophy.
- John Burton Phillips, A.B., *Indiana Univ.*, 1889,  
 A.M., *ibid.*, 1891, *Lansing.*
- Melvin Park Porter, A.B., 1893, A.M., 1894, *West Sunbury, Pa.*  
 General Psychology; Experimental Psychology; Hebrew.
- †Richard Rider Putman, B.S., 1895, *Kalamazoo.*  
 General Chemistry; Mathematics; Mineralogy.
- George Robert Ray, Jr., B.L., 1892, *Manistee.*  
 European History; American History; Pedagogy.
- Howard Monroe Raymond, B.S., 1893, *Grass Lake.*
- Edwin Carl Roedder, A.B., 1893, A.M., 1894, *Ann Arbor.*  
 German; Old English; Sanskrit.
- †George Bagg Russel, A.B., 1895, *Detroit.*  
 Comparative Constitutional Law; American History; Sociology.
- Calvin Cortland Ryder, B.S., *Hiram Coll.*, 1891, *Hiram, O.*

- †Esther Lakin Sanborn, A.B., 1895, *West Roxbury, Mass.*  
Greek; German; History.
- Henry Arthur Sanders, A.B., 1890, A.M., 1891, *Ann Arbor.*  
Latin; Greek; Classical Archæology.
- John Henry Schaffner, A.B., *Baker Univ.*, 1893,  
A.M., 1894, *Morganville, Kan.*  
Botany; Morphology of Fungi; Palæobotany.
- \*Bernard Benjamin Selling, Ph.B., 1894, *Detroit.*  
Constitutional Law; International Law; English Literature.
- Annah May Soule, B.L., 1894, *Ann Arbor.*  
United States History; Political Economy; Comparative Constitutional Law.
- Robert Clark Stevens, A.B., 1894, *Malone, N. Y.*
- Carrie Taylor Stewart, A.B., *Univ. of Kansas*, 1892, *Negaunee.*  
German; French; Gothic.
- Louis A. Strauss, B.L., 1893, Ph.M., 1894, *Ann Arbor.*  
Rhetoric; European History; English Literature.
- †Annie Sayre Thompson, A.B., 1895, *Ann Arbor.*  
American History; European History; English Literature.
- Sidney Dean Townley, B.S., *Univ. of Wisconsin*,  
1890, M.S., *ibid.*, 1892, *Ann Arbor.*  
Practical Astronomy; Theoretical Astronomy; Optics.
- Ira Dudley Travis, Ph.B., *Albion Coll.*, 1889,  
Ph.M., 1894, *Albion.*  
American History; Political Economy; European History.
- Perry Fox Trowbridge, Ph.B., 1892, *Ann Arbor.*  
Organic Chemistry; Physics; Analytical Chemistry.
- Mary Etta Trueblood, Ph.B., *Earlham Coll.*, 1893, *Jamestown, O.*  
Mathematics; German; Astronomy.
- \*Raymond Elmoine Van Syckle, B.S., 1891, *Bay City.*  
Political Economy; Political Philosophy; American History.
- Arthur Johnson Wilbor, B.S., *Lawrence Univ.*,  
1892, *Oshkosh, Wis.*
- Delos Franklin Wilcox, A.B., 1894, *Raisinville.*  
Comparative Constitutional Law; American History; Sociology.
- †Mary Gilmore Williams, A.B., 1895, *Painesville, O.*  
Latin; Greek; Political Antiquities.
- Neil Hooker Williams, B.S., 1893, *Richmond.*  
Physics; Chemistry; Mathematics.
- Clarence George Wrentmore, B.S., 1893, *Ann Arbor.*  
Civil Engineering.

#### CANDIDATES FOR A MASTER'S DEGREE AND FOR A DEGREE IN ENGINEERING, STUDYING IN ABSENTIA.

| NAME.                                                         | RESIDENCE.            |
|---------------------------------------------------------------|-----------------------|
| William Dearborn Ball, B.S., 1890,<br>Mechanical Engineering. | <i>Chicago, Ill.</i>  |
| Thomas Edson Barnum, B.S., 1892,<br>Electrical Engineering.   | <i>Oak Park, Ill.</i> |

|                                                                                                                      |                             |
|----------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Will Hazen Boughton, B.S., 1893,<br>Civil Engineering.                                                               | <i>Granville, O.</i>        |
| Allen Lysander Colton, Ph.B., 1889, A.B., 1890,<br>Astronomical Photography; Optics; Practical Astronomy.            | <i>Mount Hamilton, Cal.</i> |
| Charles Hall Cook, A.B., 1874,<br>English Literature; History; Philosophy,                                           | <i>Denver, Col.</i>         |
| Walter Dennison, A.B., 1893,<br>Latin; Greek; Classical Archæology. Holder of the Elisha Jones Classical Fellowship. | <i>Ann Arbor.</i>           |
| Ella Virginia Fitch, A.B.,<br>Latin; Greek; German.                                                                  | <i>Joliet, Ill.</i>         |
| Humphrey Snell Gray, A.B., 1893, LL.B., 1894,<br>Constitutional Law; Political Economy; History.                     | <i>Ludington.</i>           |
| David Emil Heineman, Ph.B., 1887,<br>English Drama; History of the Fine Arts; International Law.                     | <i>Detroit.</i>             |
| William Andrew McAndrew, A.B., 1886,<br>English Drama; History; Pedagogy.                                            | <i>Brooklyn, N. Y.</i>      |
| Frank Thomson Merry, B.L., 1890,<br>History; American History; Political Economy.                                    | <i>Ann Arbor.</i>           |
| William Vaughan Moses, B.S., 1890,<br>Mechanical Engineering.                                                        | <i>Cambridge, Mass.</i>     |
| Minott Eugene Porter, B.S., 1893,<br>Civil Engineering.                                                              | <i>Washington, D. C.</i>    |
| Lewis Severance, A.B., 1892,<br>French; English; History.                                                            | <i>St. Johns.</i>           |
| Lillie Maria Shaw, A.B., 1884,<br>Greek; German; Botany.                                                             | <i>Saginaw, East Side.</i>  |
| Louis Henry Shoemaker, B.S., 1889,<br>Civil Engineering.                                                             | <i>Paterson, N. J.</i>      |
| Katharine Eliza Sumner, Ph.B., 1891,<br>English Literature; History; Pedagogy.                                       | <i>Toledo, O.</i>           |
| Allen Sisson Whitney, A.B., 1885,<br>Pedagogy; German; American History.                                             | <i>Saginaw, East Side.</i>  |

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## Graduate Club.

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In January, 1894, an organization of graduate students, known as THE GRADUATE CLUB, was formed.

The objects of the club are to create and foster a spirit of fellowship among its members, to stimulate an interest in graduate work and methods, and to further the welfare of the GRADUATE SCHOOL. All students in the Graduate School are eligible for membership. The number of members at present is over sixty.

At the meetings, which are held monthly, the students and members of the Faculty join in the discussion of questions pertinent to the objects

of the club. During the current year the following subjects have been discussed.

(1) The Present Relations of Japan, China, and Corea.—President ANGELL.

(2) Compulsory Arbitration.—Judge COOLEY.

(3) Chemical Laboratories in Germany.—Professor PRESCOTT.

(4) The Odyssey.—Professor PALMER, of Harvard University.

(5) Immunity from Disease.—Dr. VAUGHAN.

(6) A Visit to the House of Commons.—Professor MC LAUGHLIN.

(7) The Beginnings of Poetry.—Professor THOMAS.

With a view of cooperating with other graduate clubs in endeavoring to unify the requirements for degrees and to encourage original investigation, this Club was represented at the convention of graduate students held in New York, in the month of April, 1895, and joined with other clubs in formulating resolutions relative to the granting of higher degrees and in publishing a "Handbook of Graduate Courses."

377.13  
1896-97  
UNIVERSITY OF MICHIGAN

DEPARTMENT OF LITERATURE, SCIENCE, AND THE ARTS

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ANNOUNCEMENT  
OF THE  
GRADUATE SCHOOL

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1896-97

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ANN ARBOR, MICH.:  
PUBLISHED BY THE UNIVERSITY  
1896



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---

1896-97

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PUBLISHED BY THE UNIVERSITY  
1896

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**THE INLAND PRESS.**

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## CALENDAR.

1896.

September 23-28. *Examination for Admission to the Department of Literature, Science, and the Arts.*

Oct. 1. FIRST SEMESTER BEGINS IN ALL DEPARTMENTS OF THE UNIVERSITY.

Nov. — Thanksgiving Recess of three days, beginning Tuesday evening, in all Departments of the University.

Dec. 18. (Evening.) Holiday Vacation begins in all Departments.

1897.

Jan. 5. Exercises Resumed.

Feb. 19. (Evening.) FIRST SEMESTER CLOSES.

Feb. 22. SECOND SEMESTER BEGINS.

April 16. (Evening.) Recess begins, ending April 26 (evening).

July 1. COMMENCEMENT IN ALL DEPARTMENTS OF THE UNIVERSITY.

**FACULTY**  
**OF THE**  
**DEPARTMENT OF LITERATURE, SCIENCE, AND THE ARTS.**

---

**Professors and Assistant Professors.**

- JAMES B. ANGELL, LL.D., *President.\**  
ALBERT B. PRESCOTT, M.D., LL.D., *Director of the Chemical Laboratory, and Professor of Organic Chemistry.*  
REV. MARTIN L. D'OUGE, LL.D., *Dean, and Professor of the Greek Language and Literature.*  
WILLIAM H. PETTEE, A.M., *Professor of Mineralogy, Economic Geology, and Mining Engineering.*  
EDWARD L. WALTER, PH.D., *Professor of Romance Languages and Literatures.*  
ISAAC N. DEMMON, LL.D., *Professor of English and Rhetoric.*  
ALBERT H. PATTENGILL, A.M., *Professor of Greek.*  
WOOSTER W. BEMAN, A.M., *Professor of Mathematics.*  
VICTOR C. VAUGHAN, PH.D., M.D., *Professor of Hygiene and Physiological Chemistry, and Director of the Hygienic Laboratory.*  
CHARLES S. DENISON, M.S., C.E., *Professor of Descriptive Geometry, Stereotomy, and Drawing.*  
HENRY S. CARHART, LL.D., *Professor of Physics, and Director of the Physical Laboratory.*  
RAYMOND C. DAVIS, A.M., *Librarian.*  
VOLNEY M. SPALDING, PH.D., *Professor of Botany.*  
HENRY C. ADAMS, PH.D., *Professor of Political Economy and Finance.*  
BURKE A. HINSDALE, LL.D., *Professor of the Science and the Art of Teaching.*  
RICHARD HUDSON, A.M., *Professor of History.*  
ALBERT A. STANLEY, A.M., *Professor of Music.*  
FRANCIS W. KELSEY, PH.D., *Professor of the Latin Language and Literature.*  
OTIS C. JOHNSON, PH.C., A.M., *Professor of Applied Chemistry.*
- 

\* The President lectures upon International Law and the History of Treaties.

- PAUL C. FREER, PH.D., M.D., *Professor of General Chemistry, and Director of the Laboratory of General Chemistry.*
- ANDREW C. McLAUGHLIN, A.M., LL.B., *Professor of American History.*
- ASAPH HALL, JR., PH.D., *Professor of Astronomy, and Director of the Observatory.*
- ISRAEL C. RUSSELL, C.E., LL.D., *Professor of Geology.*
- WARREN P. LOMBARD, A.B., M.D., *Professor of Physiology and Histology.*
- JACOB E. REIGHARD, PH.B., *Professor of Zoology, and Director of the Zoological Laboratory.*
- THOMAS C. TRUEBLOOD, A.M., *Professor of Elocution and Oratory.*
- JAMES A. CRAIG, PH.D., *Professor of Semitic Languages and Literatures and Hellenistic Greek.*
- \*JOHN C. ROLFE, PH.D., *Professor of Latin.*
- ROBERT M. WENLEY, A.M., Sc.D., *Professor of Philosophy.*
- GEORGE A. HENCH, PH.D., *Professor of German.*
- FREDERICK G. NOVY, Sc.D., M.D., *Junior Professor of Hygiene and Physiological Chemistry.*
- GEORGE HEMPL, PH.D., *Junior Professor of English.*
- EDWARD D. CAMPBELL, B.S., *Junior Professor of Analytical and Metallurgical Chemistry.*
- FRED M. TAYLOR, PH.D., *Junior Professor of Political Economy and Finance.*
- FRED N. SCOTT, PH.D., *Junior Professor of Rhetoric.*
- ALEXANDER ZIWET, C.E., *Junior Professor of Mathematics.*
- PAUL R. DE PONT, A.B., B.S., *Registrar, and Assistant Professor of French.*
- JOSEPH H. DRAKE, A.B., *Assistant Professor of Latin.*
- GEORGE W. PATTERSON, JR., A.M., S.B., *Assistant Professor of Physics.*
- G. CARL HUBER, M.D., *Assistant Professor of Histology.*
- \*JOHN O REED, PH.M., *Assistant Professor of Physics.*
- DEAN C. WORCESTER, A.B., *Assistant Professor of Zoology, and Curator of the Zoological Museum.*
- FREDERICK C. NEWCOMBE, B.S., PH.D., *Assistant Professor of Botany.*
- ALFRED H. LLOYD, PH.D., *Assistant Professor of Philosophy.*
- MAX WINKLER, PH.D., *Assistant Professor of German.*
- \*JOSEPH L. MARKLEY, PH.D., *Assistant Professor of Mathematics.*

EMORY B. LEASE, PH.D., *Assistant Professor of Latin.*

MORITZ LEVI, A.B., *Assistant Professor of French.*

### Instructors.

ELMER A. LYMAN, A.B., *Instructor in Mathematics.*

GEORGE O. HIGLEY, M.S., *Instructor in General Chemistry.*

JONATHAN A. C. HILDNER, A.M., *Instructor in German.*

DAVID M. LICHTY, M.S., *Instructor in General Chemistry.*

JOHN R. EFFINGER, JR., PH.M., *Instructor in French.*

ERNST H. MENSEL, PH.D., *Instructor in German.*

EARLE W. DOW, A.B., *Instructor in History.*

\*MOSES GOMBERG, Sc.D., *Instructor in Organic Chemistry.*

CLARENCE G. WRENTMORE, B.S., *Instructor in Descriptive Geometry and Drawing.*

KARL E. GUTHE, PH.D., *Instructor in Physics.*

CLARENCE L. MEADER, A.B., *Instructor in Latin.*

ARTHUR G. HALL, B.S., *Instructor in Mathematics.*

GEORGE REBEC, PH.B., *Instructor in Philosophy.*

FRANK R. LILLIE, PH.D., *Instructor in Zoology.*

CHARLES H. COOLEY, PH.D., *Instructor in Sociology.*

WILLIAM H. WAIT, PH.D., *Instructor in Greek, Latin, and Sanskrit.*

JAMES W. GLOVER, PH.D., *Instructor in Mathematics.*

ERNST VOSS, PH.D., *Instructor in German.*

LOUIS A. STRAUSS, PH.M., *Instructor in English.*

EDWIN C. GODDARD, PH.B., *Instructor in Mathematics.*

HENRY F. L. REICHLE, A.M., *Instructor in Latin.*

HENRY L. COAR, A.M., *Instructor in Mathematics.*

VICTOR E. FRANCOIS, *Instructor in French.*

PERRY F. TROWBRIDGE, PH.B., *Instructor in Organic Chemistry.*

PENOYER L. SHERMAN, PH.D., *Instructor in General Chemistry.*

SIDNEY D. TOWNLEY, M.S., *Instructor in Astronomy.*

ARTHUR LACHMAN, PH.D., *Instructor in General Chemistry.*

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\*Absent on leave.

# ANNOUNCEMENT OF THE GRADUATE SCHOOL.

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## GENERAL INFORMATION.

### **The University of Michigan.**

The University of Michigan is a part of the educational system of the State, and derives from the State, in one way or another, the greater part of its revenue. The University comprises the Department of Literature, Science, and the Arts, and six professional schools, each of which has its own Faculty and issues each year a separate departmental Announcement. The various faculties aggregated, in 1895-96, one hundred and thirty officers of instruction, besides numerous assistants, some of whom participate in the work of teaching. Including the Summer School, more than three thousand students, representing forty-five States and Territories, and thirteen foreign countries, were in attendance.

### **The Department of Literature, Science, and the Arts.**

In the Department of Literature, Science, and the Arts, the aim is to cover the broad field of general university study of the ancient and the modern languages and literatures, of history, philosophy, science, and the liberal arts, as distinguished from the more special work of the professional schools. Its faculty numbered, in 1895-96, eighty teachers. The students in attendance numbered about twelve hundred, of whom fifty-seven were graduates. The presence of such a number of graduate students, taken with the fact that high specialization of work is not uncommon among undergraduates, tends to create a genuine university atmosphere, and to assure the advanced student of intellectual comradeship.

### **The Libraries.**

The various libraries of the University contain about 100,000 volumes, and include a number of important special collections. Among these are the McMillan Shakespeare Library, 3,752 volumes; the Parsons Library

(political science), 4,325 volumes; the Hagerman Collection (history and political science), 2,660 volumes, and a Goethe Library of 892 volumes. The general reading room seats two hundred and ten readers, and separate rooms are provided for advanced students to work in, with the necessary books close at hand. Under certain restrictions graduate students have access to the book rooms. The library takes four hundred and fifty periodicals, and is open, in term time, fourteen hours daily, except on Sundays and legal holidays. During the summer vacation it is open six hours a day.

### **The Laboratories.**

The University has an observatory and a large number of laboratories more or less fully equipped for routine instruction and for original research. These laboratories are (omitting those connected exclusively with the work of the Engineering, Medical, and Dental Schools): the Botanical, Chemical, Geological, Histological, Hygienic, Morphological, Physical, Physiological, Psychological, and Zoological. For a fuller account of them and their various resources, as also of the University collections for the study of art, archæology, ethnology, mineralogy, palæontology, systematic zoology, etc., consult the annual Calendar, which may be had gratis on application to Mr. James H. Wade, Secretary of the University.

### **The Scientific Societies.**

There are connected with the University a number of voluntary scientific organizations which add not a little to the graduate student's opportunity for scientific training. The membership of these societies consists usually of University teachers and advanced students who are pursuing a common specialty. They are variously organized and meet weekly, fortnightly, or monthly, as the case may be, for the reading and discussion of formal papers, for reports upon observation and experiment, reviews of recent technical literature, etc.

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## **ORGANIZATION OF GRADUATE WORK.**

### **The Graduate School.**

The Graduate School was organized in the Spring of 1892 in connection with the Department of Literature, Science, and the Arts. Its purpose is to bring into increased prominence the numerous advanced courses offered in that department—courses that have developed during the past few years from the continual extension of the elective system,—and to recognize and announce them as something distinct from the work of an ordinary college course. It aims to make provision for a

more systematic and efficient administration of this higher work, and, so far as possible, for the separate instruction of graduate students. It also aims to lay foundations for the future development of university (as distinguished from collegiate) work. The management of the School is entrusted to an Administrative Council, of which the President of the University is chairman.

The regulations of the University respecting graduate work, that were formerly in force, have been modified in a few particulars by the Council, and it is possible that still further changes may be made in the year to come. The more important of these regulations are explained in the pages that follow.

### **The University System.**

Every graduate student who is a candidate for a higher degree, works upon the so-called 'university system,' the essential features of which are specialization of study, a final examination, and a thesis. The student selects a 'major study' and, in general, two 'minor studies,' his selection being subject, however, to the approval of the Council. When the choice has been made and approved, the student's work is henceforth under the immediate supervision of a committee consisting of those professors who have charge of the studies chosen, the one having charge of the major study being chairman. This committee arrange a course of study suited to the desires, needs, and previous attainments of the student, assist him in the choice of a subject for a thesis, pass judgment upon his thesis when it is written, conduct his examination, and, if he passes, report him to the Council as worthy of the degree sought. The nature of the work prescribed, and of the committee's oversight, varies more or less according to the subjects chosen, the degree sought, and the previous attainments of the student. The work may consist of attendance upon certain specified courses of study, of reading to be done privately and reported upon, or of an original research to be carried on more or less independently. The requirement of a thesis is sometimes waived in the case of a candidate for a *master's* degree. It may be added also that for the master's degree the Council may, at their discretion, approve a course of study which does not confine the candidate rigorously to a major and two minor studies.

Graduate students who do not wish to work for a higher degree are admitted to any course offered in the Department of Literature, Science, and the Arts, upon satisfying the professor in charge that they are qualified to pursue the work to advantage.

## THE HIGHER DEGREES.

**Degrees Conferred.**

The higher degrees conferred in the Department of Literature, Science, and the Arts, are those of Master of Arts, Master of Science, Master of Philosophy, Master of Letters, Doctor of Philosophy, Doctor of Science, and Doctor of Letters.

**The Masters' Degrees.**

A Bachelor of this University, or of any other reputable university or college, may become a candidate for the corresponding master's degree, and may be recommended for the degree after one year's residence at the University, provided he pass a satisfactory examination on the course of study prescribed by his committee. A thesis may, or may not, be included in the requirements for a degree, as the committee in charge of the student's work may determine.

The practice of allowing graduates of this University to enter upon studies *in absentia* as candidates for a master's degree, has been discontinued. But a graduate who has already completed a considerable portion of the term of residence prescribed for a master's degree, may be allowed to continue his studies for the degree, without further residence at the University, on such conditions as the Administrative Council may determine in each case. *This privilege is restricted to graduates of this University.*

Students properly qualified may be permitted to pursue at the same time studies for a master's degree, and studies in any of the professional schools, on condition that the term of study and residence in the Graduate School be extended to cover two years instead of one.

**The Doctors' Degrees.**

1. The degree of Doctor of Philosophy is open to persons that have received the degree of Bachelor of Arts, or of Bachelor of Philosophy; the degree of Doctor of Science to persons that have received the degree of Bachelor of Science; and the degree of Doctor of Letters to persons that have received the degree of Bachelor of Letters; but no student will be accepted as a candidate for the doctor's degree who has not a knowledge of French and German sufficient for purposes of research.

2. It is not intended that the doctors' degrees shall be won merely by faithful and industrious work for a prescribed time in some assigned course of study, and no definite term of required residence can be specified. As a rule, three years of graduate study will be necessary, the last two semesters of which must be spent at this University. The period of three years, however, may be shortened in the case of students who, as



undergraduates, have pursued special studies in the direction of their proposed graduate work.

3. No student will be enrolled as a candidate for the doctor's degree until he has been in residence as a graduate student for at least one year. [This rule may be waived in the case of those who come properly accredited from a Graduate School of some other University, and of those who, as undergraduates in this University, have shown special proficiency in the line of their proposed graduate work.]

4. A student wishing to become a candidate for the doctor's degree must make a formal application to be so enrolled at least two semesters prior to the time of presenting himself for examination.

5. A candidate for a doctor's degree must take a major study that is substantially co-extensive with some one department of instruction in the University. He must also take two minor studies, one of which may be in the same department as the major, but involving a more thorough treatment of the same. Both minors must be cognate to the major, and all studies must be subject to the approval of the Administrative Council.

6. **THE THESIS.**—The thesis is of great importance. It must exhibit creditable literary workmanship and a good command of the resources of expression, but it must depend for acceptance more upon its subject-matter than upon its formal or rhetorical qualities. It must be an original contribution to scholarship or to scientific knowledge. The inquiry should be confined within narrow bounds. The treatment should be as concise as the nature of the subject permits, and show familiarity with the history of the problem treated, with the literature bearing upon it, and with the latest methods of research applicable to it. Every thesis should contain a clear introductory statement of what it is proposed to establish or investigate, and likewise a final resumé of results. It should also be accompanied by an index of contents and a bibliography of the subject. It is expected that the preparation of an acceptable thesis will usually require the greater part of one academic year.

### **Special Regulations Relating to the Higher Degrees.**

1. Applicants for an advanced degree are required to announce to the Council, through the Secretary, as early as the fifteenth of October of each year, the particular branches of study to which they wish to give special attention. The supervision of their work will then be entrusted to the proper committee.

2. The subject of the thesis for a doctor's degree must be chosen, and must be approved by the committee concerned, as early as the first of November of the college year in which the applicant expects to take his degree, and the subject of the thesis, when required for a master's degree, must be chosen and approved as early as the first of December.

3. The thesis must be completed and put into the hands of the chairman of the proper committee as early as the first of May of the year in which the applicant expects to take the degree.

4. The thesis must be prepared for close scrutiny with reference not only to its technical merits, but also to its merits as a specimen of literary workmanship. It must be preceded by an analytical table of contents, and a carefully prepared account of the authorities made use of.

5. The thesis must be read and defended in public at such time as the Council may appoint; and, in case of a master's degree, a bound copy, either written or printed, must be deposited in the University library.

6. Candidates for the degree of Doctor of Philosophy, Doctor of Science, or Doctor of Letters, in case of the acceptance of their theses, are required to have the accepted theses printed, in full or in part as may be approved by the responsible committee, and to present twenty-five copies of the same to the University library. To guarantee the printing of the thesis every candidate for the doctor's degree will be required to deposit with the Treasurer of the University, between the date of the acceptance of his thesis and the time fixed for his examination, the sum of fifty dollars, which deposit will be returned to him in case of failure to pass his examination, or whenever he shall cause his thesis to be printed at his own expense, or shall have it published in a form and under auspices approved by the responsible committee.

In the printing of the thesis at his own expense the candidate will be expected to use good substantial paper and slightly typography. A page four inches by six, with outside margins of at least one inch, is recommended.

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## ADMISSION AND REGISTRATION.

All applicants for admission to the Graduate School must first report to the Dean of the Department of Literature, Science, and the Arts, and present their credentials. They will then be referred to the Secretary of the Administrative Council for the arrangement of courses of study.

The privileges of the school are open to graduates of the Department of Literature, Science, and the Arts of this University, and to graduates of other universities and colleges who satisfy the Administrative Council that they are qualified to pursue with profit the advanced courses of study offered in the school.

Graduates of institutions where the undergraduate courses of study are not substantially equivalent to the course prescribed at this University will ordinarily be required to do an additional amount of undergrad-

uate work, or to prolong their term of residence, before being admitted to full candidacy for a higher degree.

Graduates of this University, or of other institutions, who do not wish to become candidates for a degree, may be admitted and registered as special resident graduates.

Graduates of other institutions who are candidates for a bachelor's degree in the Department of Literature, Science, and the Arts, are not registered in the Graduate School.

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## FEES AND EXPENSES.

**Matriculation Fee.**—Every student before entering any department of the University is required to pay a matriculation fee. This fee, which, for citizens of Michigan, is ten dollars, and for those who come from any other state or country, twenty-five dollars, is paid but once, and entitles the student to the privileges of permanent membership in the University.

**Annual Fee.**—In addition to the matriculation fee, every student has to pay an annual fee for incidental expenses. This fee in the Department of Literature, Science, and the Arts is, for Michigan students, thirty dollars; for all others, forty dollars. It is paid the first year of residence at the University, and every year of residence thereafter. Resident graduates are required to pay the same annual fee as undergraduates. Graduate students studying *in absentia* for a master's degree pay an annual fee of ten dollars.

The matriculation fee and the annual fee must be paid at the beginning of the academic year. A by-law of the Board of Regents provides that no student or graduate shall be allowed to enjoy the privileges of the University until he has paid all fees that are due.

**Laboratory Expenses.**—Students who pursue laboratory courses of study are required to pay for the materials and apparatus actually consumed by them. The deposits required in advance are different in the different courses, ranging from one to twenty dollars. The laboratory expenses of students will vary with their prudence and economy. Experience has shown that in the chemical laboratory the average expense for all courses is about one dollar and twenty cents a week.

**Diploma Fee.**—The fee for the diploma given on graduation is ten dollars, and the by-laws of the Board of Regents prescribe that no person shall be recommended for a degree until he has paid all dues, including the fee for diploma.

**Other Expenses.**—Students obtain board and lodging in private families for from three to five dollars a week. Clubs are also formed in

which the cost of board is from one dollar and a half to two dollars and a half a week. Room rent varies from one dollar to three dollars a week for each student. The annual expenses of students, including clothing and incidentals, are, on the average, about three hundred and seventy dollars. Students on arriving in Ann Arbor can obtain information in regard to rooms and board by calling at the Steward's office.

There are no dormitories, no commons, and no stipends available for students in the Graduate School (with the exception of the Elisha Jones classical fellowship and a fellowship in chemistry).

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## COURSES OF INSTRUCTION.

The following list of advanced courses does not attempt in all cases to discriminate graduate from undergraduate instruction; the reason being that the possession of a bachelor's degree may mean much or little as regards a student's proficiency in a particular subject. With a few exceptions, the courses here mentioned all presuppose a somewhat extensive preliminary study of the subject, a study covering from one to six years, according to the circumstances. In most instances the attempt is made to indicate, in terms of both time and work, the amount of preparation required for entrance upon the courses described. Many of the courses are advanced electives which are open to undergraduates, but have been shown by experience to be suited to the needs of many graduates. Different departments of instruction have adopted different modes of announcing and explaining their work. For further information reference may be made directly to the head of the department concerned.

### GREEK.

The courses here announced presuppose, in general, four years' previous study of Greek, viz., the usual preparatory course of two years, and two years of collegiate study devoted to the history of Greek literature and to reading from Lysias, Xenophon, Homer, Demosthenes, the Tragic Poets, and Aristophanes.

Professor D'OUGE:—

#### Teachers' Seminary.

This course is intended to give students who expect to teach Greek training in teaching the elements of inflection and syntax. In the first semester, lectures will be given on the chief results of the modern comparative treatment of Greek sounds and inflections. In the second semester, the course will include the writing of Greek Prose, and a discussion of the principles of Greek Syntax.—*Two hours a week, throughout the year.*

### Seminary in Tragedy.

Several of the plays of Euripides will be studied with special reference to the principles of Greek dramatic art.—*Three hours a week, first semester.*

### The History of Greek Art from the beginnings to the Roman Period.

Gardner's Handbook of Greek Sculpture and Collignon's Manual of Greek Archæology will be made the basis of a more general study.—*Three hours a week, first semester.*

### Pindar.

The Olympian and Pythian Odes.—*Two hours a week, first semester.*

### Studies in Plato's Republic.

*Two hours a week, second semester.*

### Greek Antiquities.

Lectures on the private life of the ancient Athenians, illustrated by means of stereopticon views.—*One hour a week, second semester.*

### Modern Greek.

Selections from the best modern Greek writers.—*Two hours a week, second semester.*

### Professor PATTENGILL:—

#### Isaeus and Demosthenes.

Legal orations, with special reference to Attic law and judicial procedure.—*Three hours a week, first semester.*

#### The Bucolic Poets.

Theocritus, Bion, Moschus.—*Four hours a week, second semester.*

### Dr. WAIT:—

#### Greek Epigraphy.

Introduction to Greek Epigraphy and reading of inscriptions.—*Two hours a week, second semester.*

### LATIN.

The courses here announced presuppose, in general, seven years' previous study of Latin, viz., the usual preparatory course of four years, and three years of collegiate study devoted to Livy, Cicero, Horace, Terence, Latin writing, and the systematic study of Roman literature.

## Professor KELSEY:—

## Graduate Seminary.

Critical study of Lucretius. Open to graduate students only.—  
*Two hours a week, throughout the year.*

## Teachers' Course.

Interpretation of selected portions of Caesar and Virgil, with investigation of syntactical subjects.—*Three hours a week, throughout the year.*

## Lucretius, De Rerum Natura. Interpretation and Lectures.

*Three hours a week, first semester.*

## [Introduction to Classical Philology. Lectures.

A brief outline of the history and present condition of classical studies is presented, followed by an extended discussion of the methods employed in classical philology. Attention is also paid to the bibliography of the subject. Several lectures in this course will be given by other members of the classical faculty.—*Three hours a week, first semester.* This course is omitted in 1896-97.]

## [Introduction to Roman Archæology.

Lectures on the architecture and topography of Ancient Rome, and on sculpture and painting in the Roman period. This course will be illustrated by photographs, engravings, and the occasional use of stereopticon slides.—*Four hours a week, second semester.* This course is omitted in 1896-97.]

## Latin Inscriptions.

Reading of inscriptions of different periods from squeezes and facsimiles. Interpretation of inscriptions with special reference to the study of life and society under the Early Empire.—*Three hours a week, second semester.*

## Professor ROLFE:—

## [Latin Grammar.

Lectures on the phonology and morphology of the Latin language, with an outline of the syntax scientifically considered.—*Four hours a week, first semester.* This course is omitted in 1896-97.]

## [The Italic Dialects.

Lectures on the phonology and morphology of the dialects, with the interpretation of selected inscriptions. *Three hours a week, second semester.* This course is omitted in 1896-97.]

## [The Letters of Cicero.

Interpretation of selected letters, with study of the Latin epistolary style.—*Three hours a week, second semester.* This course is omitted in 1896-97.]

## [The Letters of Pliny the Younger.

Interpretation of selected letters, with study of Roman life and society at the end of the first century, A. D.—*Three hours a week, second semester.* This course is omitted in 1896-97.]

## Assistant Professor DRAKE:—

## Selections from the Annals of Tacitus.

Interpretation and lectures.—*Three hours a week, first semester.*

## [Seutonius and Velleius Paterculus.

Lectures and interpretation.—*Three hours a week, first semester.* This course is omitted in 1896-97.]

## Historical Proseminary.

Study of historical subjects from the sources. The age of the Antonines.—*Two hours a week, second semester.*

## The Tusculan Disputations of Cicero.

Rapid reading, with an examination of Cicero's philosophical views.—*Three hours a week, second semester.*

## Assistant Professor LEASE:—

## Latin Writing.

Attention is given not only to correctness of expression but also to matters of style and the finer distinctions of the language.—*Two hours a week, first semester; three hours a week, second semester.*

## Roman Comedy.

Lectures upon the history of the Roman drama, the meters of Plautus and Terence, and peculiarities of early Latin syntax. Special study of the *Miles Gloriosus*.—*Three hours a week, first semester.*

## Christian Latin.

Selections from early Christian writers, with lectures upon the Christian Latin literature.—*Three hours a week, second semester.*

## Mr. MEADER:—

## The Institutes of Gaius and Justinian.

Interpretation of the text, with special study of the technical terms of the Roman Law.—*Three hours a week, second semester.*

## SEMITICS.

The courses in Semitics are intended for:—(1) students who are seeking a liberal culture; (2) students of “classical” and modern languages, furnishing them with *necessary* data for the study of the philosophy of language and phonetic laws; (3) students who wish to make a special study of Semitics (the courses leading to the degree of Doctor of Philosophy); (4) students of ancient history; (5) students of art and archæology; (6) students of ethics and theology.

Professor CRAIG: —

## Hebrew.\*

1. Genesis. Baer and Delitzsch's Text. Harper's Elements of Grammar. Craig's Hebrew Word Manual.—*Three hours a week, first semester.*

2. Deutoronomy, Joshua, I Samuel, Ruth, Jonah. Theile's Biblia Hebraica. Davies's Lexicon.—*Three hours a week, second semester.*

3. Prophetic Literature: Amos and Isaiah. Study of the nature and content of prophecy in its literary, historical, and ethical aspects. Text-books: Hebrew Bible, Driver's Hebrew Moods and Tenses.—*Two hours a week, first semester.*

4. The Book of Job, including study of the literary structure and critique of the dominant ideas. Baer and Delitzsch's Text and Haupt's Polychrome Edition (text by Siegfried).—*Two hours a week, second semester.*

## Assyrian.

1. Introduction to Easy Historical Inscriptions from the Ninth Century, B.C., with study of the grammar. Text-book: Delitzsch's Assyrische Lesestücke, dritte Auflage.—*Three hours a week, first semester.*

2. Historical Inscriptions. Selections from the Cuneiform Inscriptions of Western Asia (R. I–V).—*Second semester.*

3. The Babylonian Stories of Creation, the Deluge, and the War of Marduk against Tiamat, with lectures on the Cosmology of the Babylonians. Inscription of Tiglathpileser I, circa 1120 B.C.—*Two hours a week, first semester.*

4. Religious Literature. King's “The Prayers of the Lifting-up of the Hand.” Craig's “Religious Texts.”—*Second semester.*

5. Seminary in Sumerian.—*Two hours a week, first semester.*

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\*After 1896–97, candidates for a higher degree who wish to elect Hebrew as one of the subjects leading to the degree, must have previously completed Courses 1 and 2 or an equivalent.



## Arabic.

1. Introductory Course. Grammar and reading. Socin's Arabic Grammar (English edition) and Brünnow's Chrestomathy.—*Two hours a week, first semester.*

2. Selected Suras from the Quran, with introductory lectures on the life of Muhammed and Muhammedanism.—*Two hours a week, first semester.*

## HELLENISTIC GREEK.

Professor CRAIG:—

## New Testament.

Acts of the Apostles, including grammatical study of the peculiarities of Hellenistic Greek, and historical introduction to the book and the apostolic period. Text-Books: Westcott and Hort's Greek New Testament, revised edition with introduction by Ph. Schaff; Thayer's Winer's New Testament Grammar; Thayer's Greek-English Lexicon. *Two hours a week, first semester.*

## Septuagint.

Introductory lectures with selected readings from the historical and prophetic books. Apocrypha: Maccabees, Books I and II. Text-books: Vetus Testamentum Græce by L. Van Ess, or The Old Testament in Greek by H. B. Swete, Vols. I-III. Grammar and lexicon as in the first semester, and Liddell and Scott's Lexicon.—*Two hours a week, second semester.*

## FRENCH.

Students will not be considered as taking graduate work in French, whether graduates of this University or of any other institution, who have not had the equivalent of at least Courses 1, 2, 3, 6, 7, 8, 20, and 21, as given in the undergraduate department of the University and described in the University Calendar for 1895-96, pages 64 and 65. These courses include grammar and composition, the reading of classic and modern prose, and the classic and modern drama.

Graduate work is either chiefly literary or chiefly linguistic, but it is expected that for the doctor's degree at least, and it is advised that for the master's degree as well, some work shall be done in both directions.

For students who choose to direct their work chiefly to the literature, opportunity will be given in the *first semester* of 1896-97 to study the Eighteenth Century dramatists, the Sixteenth Century literature, and some of the leading French philosophical writers; in the *second semester* the Seventeenth Century literature, the pre-revolutionary literature, Voltaire, Montesquieu, Rousseau, etc., the romantic movement at the begin-

ning of the present century, and the satirical spirit in French literature. Private work will be assigned when it is thought desirable by the Professor in charge.

The oldest French literature will be studied in connection with the study of Old French, which will be continued *throughout the year*.

A teachers' course in French will be open to candidates for a master's degree who intend to teach that language.

The courses in French will be given by, or under the direction of, Professor WALTER.

### ITALIAN.

Students will not be considered as taking graduate work in Italian, who have not had the equivalent of Courses 1 and 2 as described in the University Calendar for 1895-96, page 66. In 1896-97, courses in Dante's *Divina Commedia* and *Vita Nuova* will be offered.

The courses in Italian will be given by, or under the direction of, Professor WALTER.

### SPANISH.

Students will not be considered as taking graduate work in Spanish, who have not had the equivalent of Courses 1 and 2 as described in the University Calendar for 1895-96, page 66. In 1896-97, dramas of Lope and Calderon will be offered.

The courses in Spanish will be given by, or under the direction of, Professor WALTER.

### GERMAN.

The undergraduate courses, not here mentioned, provide for four years' study, five hours a week. Considerably less than that, however, is a satisfactory preparation for the courses described below.

Courses 5a, 5b, 5c, 6a, 6b, and 6c (compare University Calendar for 1895-96, pages 67 and 68) are primarily intended for undergraduates, but are recommended for graduates who wish to study the chief dramas of the classical period. Especially are Courses 5a and 5b (*Faust*, Parts I and II) suited for graduates.

Professor HENCH:—

#### Modern German Grammar from a Historical and Comparative Point of View.

Lectures with outside reading and quizzes. Intended (1) for undergraduates, who are preparing to teach German in the secondary schools, (2) as an introductory course on Germanic philology for graduates. First semester, phonology and morphology; second semester, syntax.—*Three hours a week, throughout the year.*

## History of German Literature.

Lectures and readings from Max Müller's German Classics. A survey of German literature in its development from the beginnings down to the death of Goethe. Advanced course open to undergraduates and to graduates.

I. From the earliest time to the end of the Middle Ages.—*Three hours a week, first semester.*

## Old High German.

Introductory course. Lectures based upon Braune's *Abriss der althochdeutschen Grammatik*, 2 Aufl., and readings from Braune's *Althochdeutsches Lesebuch*, 3 Aufl. Primarily for graduates.—*Two hours a week, second semester.*

Assistant Professor WINKLER:—

## History of German Literature.

II. Modern Period.—*Three hours a week, second semester.*

## German Romanticism.

Lectures and assigned readings. The beginnings of German Romanticism. Influence of Kant, Fichte, and Schelling upon the Romantic movement. Its relation to German Classicism and to the social and political life of the times. The younger Romantic movement. The period of the wars of liberation. The intellectual movement leading to the revolution of 1848. Advanced course open to undergraduates and graduates.—*Two hours a week, throughout the year.*

Dr. MENSEL:—

## Elementary Middle High German.

Lectures and recitations. Text-books: Paul's *Mittelhochdeutsche Grammatik*, 4 Aufl., and Bachmann's *Mittelhochdeutsches Lesebuch*. An advanced course for undergraduates and graduates.—*Two hours a week, first semester.*

## Nibelungenlied and Gudrun.

Reading, with lectures on language, mythological elements, and composition of the popular epic. Text-books: Zarncke's *Nibelungenlied*, 6 Aufl., and Symons's *Gudrun*. Continuation of last named course.—*Two hours a week, second semester.*

## GOTHIC.

Professor HENCH.

## Introductory Course.

Lectures on phonology and morphology, and reading of the Gospels. Text-books: Braune's *Gotische Grammatik*, 4 Aufl., or Balg's translation of Braune, 2 ed. Primarily for graduates. *Two hours a week, first semester.*

## Advanced Course.

Epistles and Skeireins as contained in Heyne's *Ulflas*, 9 Aufl., or Balg's *First Germanic Bible*. Lectures on Historical German Grammar based on Streitberg's *Urgermanische Grammatik*. Continuation of last named course.—*Two hours a week, second semester.*

## SCANDINAVIAN.

Professor HENCH.

## Old Norse.

Introductory course. Lectures on phonology and morphology based on Holthausen's *Altisländisches Elementarbuch* and Noreen's *Altnordische Grammatik I*, 2 Aufl., and reading of *Gunnlaugssaga Ormstungu*, ed. Mogk, and *Volsungasaga*, ed. Ranisch. Primarily for graduates.—*Two hours a week, second semester.*

## ENGLISH AND RHETORIC.

The advanced work of this department proceeds along three main lines:—English and American Literature; History and Philology of the English Language; and Rhetoric. Advanced courses in Oratory are also offered in connection with this department.

The following courses (open also to undergraduates who are prepared to take them) will ordinarily be found adapted to the needs of graduate students. In case of students who have specialized in English for their first degree, additional advanced courses for graduate study are provided after conference with the candidate. Some of the courses given in recent years are the following: The Development of the English Novel; The English Satirists of the Seventeenth and Eighteenth Centuries; The Romantic Revival in England at the close of the last century; The Pre-Shakespearian Drama in England; Shakespeare's Histories.

Professor DEMMON:—

## English Literature Seminary.

Each student is expected, first, to present two papers during the semester, one an essay upon an assigned masterpiece, the other a

critique of a fellow-student's essay; second, to participate each week in a general *ex tempore* discussion of the work under consideration; third, to read the entire list of works with which the course deals, together with such critical literature on each subject as there may be time for. The aim of the course is to lay a foundation for correctly estimating literary masterpieces of widely varying types. The list of masterpieces is as follows: More's Utopia; Bacon's Essays; Milton's Areopagitica; Carlyle's Sartor Resartus; George Eliot's Silas Marner; Spenser's Faery Queen, Book I; Shakespeare's Sonnets; Milton's Paradise Lost; Dryden's Absalom and Achitophel; Pope's Essay on Man; Wordsworth's Excursion; Browning's Soul's Tragedy; Tennyson's Maud; Swinburne's Atalanta in Calydon.—*First semester.*

### Shakespeare Seminary.

The method is similar to that in the preceding course. The plays selected are: A Midsummer Night's Dream; The Merchant of Venice; As You Like It; Twelfth Night; The Tempest; Richard III; the two parts of Henry IV; Henry V; Hamlet; Othello; King Lear; Macbeth; Coriolanus.—*Second semester.*

### American Literature Seminary.

Authors studied: Irving, Poe, Hawthorne, Bryant, Longfellow, Emerson, Thoreau, Bayard Taylor, Whittier, Holmes, Lowell, Howells and James. Representative works of the authors named are studied, and an attempt is made to discover the distinctively American element by a comparative study with British authors.—*Second semester.* When this subject is taken for an advanced degree, individual work is assigned for the first semester, upon which the candidate is expected to make weekly reports.

### Principles of Criticism.

Lectures. Candidates who take their major in English Literature are expected to take this course in connection with the seminary work in English Literature and Shakespeare.—*Throughout the year.*

### Studies in the text of Shakespeare.

The aim will be to illustrate the methods of textual study as applied to a play like Hamlet, and the difficulties to be overcome in establishing a text. The McMillan Shakespeare Library affords a very full apparatus for these studies.—*Two hours a week, first semester.*

## Professor HEMPL:—

## Old-English \* Syntax.

The investigation of specific problems, together with a brief general survey of the subject.—*First semester.*

## Old-English Phonology and Morphology.

A study of early West-Saxon prose, with special reference to sounds and inflection.—*Second semester.*

## Historical English Grammar.

A general survey of the subject, and the investigation of the origin and development of impugned Modern-English idioms. — *First semester.*

## Old-English Poetry.

A study of early English literature, with special reference to the political monuments.— *Second semester.*

## Spoken English.

A study of colloquial English as distinguished from the English of books and of formal speech, and the investigation of the more important facts as to the fortunes of English speech in this country.—*Second semester.*

Students prepared to do advanced work in Old English may take the courses in Old-English syntax and in Old-English phonology and morphology. At the same time with the syntax, the general subject of historical English Grammar may be taken up, to be followed by the study of the modern spoken language; but students who desire to make a study of early English Literature will take instead the work in Old-English poetry, to be accompanied, at their choice, by the undergraduate course in Transitional and Early Middle English. Students not yet prepared to do advanced work in Old English will omit or defer the course in Old-English syntax, and will begin the subject with the undergraduates, preparing themselves for the two Old-English courses offered in the second semester.

## Professor SCOTT:—

## Development of Rhetorical Theory.

A historical and comparative study of the growth of rhetorical theory from Aristotle to the present time.—*Throughout the year.*

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\* The term "Old English" is used in this Announcement for the period of English often called "Anglo-Saxon."

## Professor TRUEBLOOD:—

## Study of Great Orators, ancient and modern.

Lectures on methods of public address and sources of power. Study of representative selections. The method is similar to that in the English Literature Seminary.—*Throughout the year.*

## Oral Discussions.

This course is designed to develop readiness of extemporization. It involves the application of the principles of formal logic and elocution in the discussion of leading topics of the day. Students are required to present briefs of the subjects discussed.—*Second semester.*

## HISTORY.

The graduate work described below presupposes such information and training as is represented by undergraduate Courses 1, 2, and 3 (see University Calendar for 1895-96, page 74), supplemented by one or more advanced undergraduate courses. In indicating the courses named below as adapted to the needs of graduate students, it is not intended to exclude other advanced undergraduate courses, especially those in English constitutional history, in mediæval history, and in American colonial history, which, in certain cases, graduate students will be asked to take.

A large part of the work of the graduate student will consist of individual research and investigation carried on under the personal supervision of the professor in charge. To insure such supervision two seminaries have been organized exclusively for graduates. The work of these seminaries has been so arranged that the same student may remain a member of the seminary for two or more years. In the library building are seminary rooms in which graduate students may carry on their work. In these rooms is shelved the Hagerman collection of books on history and political science, including many works to which the student has frequent occasion to refer. As occasion requires, books in special lines are placed in the seminary rooms for the use of advanced students, and everything is done to make the library serve the purpose of research.

## Professor HUDSON:—

## The History of Europe since 1789.

The French Revolution and the Empire of Napoleon will be dealt with in the *first semester*. In the *second semester* a study will be made of the national movement of the present century, and of the condition, relations, and policy of the leading European states.

## Seminary in European History.

During the *first semester* a study will be made of the social and

political condition of Russia and its advance both in Europe and in Asia. The subject for the *second semester* will be Bismarck and his work.—*Three hours a week.*

### Political Institutions.

In the *first semester* the course will deal with English institutions; in the *second semester* with the institutions of Germany, Switzerland, France, and other European states.—*Two or three hours a week.*

These courses will be supplemented by others dealing with municipal institutions of the countries named.—*One hour a week.*

### Professor McLAUGHLIN:—

#### The Political and Constitutional History of the United States, 1776–1861.

The purpose of this course is the careful study of the origin of the Constitution, its interpretation in history, the development of our political system, and the growth and tendencies of political parties. The work is based upon lectures and the careful examination of prescribed texts. The student is expected also to read in the library and to form a wide acquaintance with the secondary, and with some of the primary, authorities. Weekly reports on the reading are required. Those who have not had a thorough course in colonial history will find it desirable to take undergraduate Course 13 (University Calendar for 1895–96, page 76) in connection with this course.—*Three times a week, throughout the year.*

#### Seminary in American History.

The aim of the seminary is to guide and direct the student in the use of primary authorities and to give instruction in methods of research. Special subjects of investigation are assigned to members of the seminary, and regular reports are made. Students at work upon theses are expected to report difficulties and successes, and are guided in their work. During a portion of the year the more important constitutional questions of the rebellion and the period of reconstruction are discussed, and there is an examination of the leading documents of this period.—*Two hours a week, throughout the year.*

#### Constitutional Law and Political Institutions of the United States.

In this course there is a consideration of the Constitution as it has been interpreted by the courts, and a study of our political system as it appears in action. Graduate students electing this work will be expected to read important texts, to examine leading cases, and to



report on problems in politics and administration.—*Three times a week, for one semester.*

In addition to following the three courses just described, graduate students will meet periodically to make reports on current literature, to discuss new books, and to examine important political questions or decisions of the courts.

## PHILOSOPHY.

The advanced courses described below and marked with an asterisk presuppose instruction in logic, ethics, and general psychology; also a general introduction to philosophy and a somewhat extended study of the history of philosophy, ancient, mediæval, and modern. Candidates for a higher degree who have not had a preparation equivalent to this will be expected to take certain of the lower courses, either before entering upon, or in connection with, their graduate work. Advanced courses bearing upon the history of philosophy are also given in the departments of Greek, Latin, French, and German. The courses in mathematics are strongly recommended for students specializing in philosophy.

### A. HISTORY OF PHILOSOPHY.

Professor WENLEY:—

#### \*The Philosophy of Kant.

Lectures, and study of the Critique of Pure Reason.—*Two hours a week, first semester.*

#### \*Special Study in Kant.

For the more detailed study of special points than the preceding course affords.—*One hour a week, first semester.*

#### \*The Philosophy of Hegel.

Lectures and study of the Logic.—*Two or three hours, the third hour for special study and preparation of a thesis, second semester.*

#### [\*Philosophy Since Hegel.

Lectures and reading.—*Two or three hours a week, second semester.* This course is omitted in 1896-97, but may be expected in 1897-98.]

Assistant Professor LLOYD.

#### The History of Philosophy.

A general outline of the subject from Thales to the present century. The course is designed to state the development of philosophical problems and concepts, and thus to give the student his bearings in

philosophy. It is therefore highly advisable, if this course has not been taken before beginning graduate work, that it be taken at once upon beginning it.—*Three hours a week, throughout the year.*

### Supplementary work in the History of Philosophy.

The object of this course is to introduce the student to the methods of investigation and discussion in the subject. Some special points of the general course are taken up and given more detailed consideration.—*One hour a week, throughout the year.*

#### \*The Philosophy of Spinoza.

Elwes's translation. Lectures, and study of the Ethics.—*Two hours a week, first semester.*

#### \*Special Study in Spinoza.

For the more detailed study of special points than the preceding course affords.—*One hour a week, first semester.*

Mr. REBEC:—

#### History of Ancient Ethics.

Lectures and assigned reading.—*Two hours a week, first semester.*

#### \*Plato's Republic.

Collateral reading and theses.—*Two hours a week, first semester.*

#### The Philosophy of Hume.

Origin, development, and influence of his thought. Lectures, reading, and theses.—*Two hours a week, second semester.*

### B. ETHICS.

Professor WENLEY:—

#### Metaphysics of Ethics.

Lectures and reading.—*Two hours a week, second semester.*

Assistant Professor LLOYD:—

#### Systematic Ethics.

Lectures and reading.—*Two or three hours a week, the third hour for special study and thesis, second semester.*

### C. PSYCHOLOGY.

The Psychological Laboratory is well equipped for original investigation.

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[Representative Modern Psychologists.

Lectures and reading.—*Two hours a week, throughout the year.*  
This course is omitted in 1896-97.]

[Beginner's Course in Experimental Psychology.

*Two hours a week, each semester.* This course is omitted in 1896-97.]

[\* Research course in Experimental Psychology.

*Throughout the year.* This course is omitted in 1896-97.]

D. SPECIAL COURSES.

Professor WENLEY:—

\* The Relation between Science and Philosophy.

*Two hours a week, throughout the year.*

Assistant Professor LLOYD:—

Political Philosophy.

A critical study of society, of sovereignty, rights, duty, and of the idea of the social organism.—*Two hours a week, first semester.*

[Philosophy of Religion.

*Two hours a week, second semester.* This course is omitted in 1896-97.]

Mr. REBEC:—

Aesthetics.

A historical review of leading theories and their connection with philosophical systems. Bosanquet's *History of Aesthetics* will serve as a basis of study.—*Two hours a week, first semester.*

\* The Relation of Rhetoric to Philosophy.

A study of the philosophical basis of discourse.—*Two hours a week, second semester.*

Professor WENLEY, Assistant Professor LLOYD, and Mr. REBEC:—

\* Journal Club.

Reading of journals and new publications. Reports and discussions. Special reference to studies in other departments.—*Two hours a week, throughout the year.*

## THE SCIENCE AND THE ART OF TEACHING.

Three courses constitute the foundation of the work in this department. Course one, four hours a week for one semester, is a practical course, dealing with methods of instruction, general school-room practice, school hygiene, and school law. Course two, also four hours a week for one semester, theoretical and critical, deals with the principles underlying teaching and government, as deduced from the facts of human nature, physical, mental, and moral, and the educational values or uses of studies. Course three, three hours a week for one semester, devoted to school supervision, deals especially with the duties of superintendents and principals, including the arts of constructing courses of study and grading schools, and conducting examinations, teachers' meetings, institutes, etc. These courses are open to students seeking advanced degrees, and are sometimes pursued by them with interest and advantage. Such students are strongly advised to take course two, at least, if they have never studied the science of teaching, provided they intend to follow the art of teaching. As the three courses are strictly professional, lying wholly outside of the field of general study, there is manifest reason in recommending them to graduate students, although elementary.

Graduate students who have had this more elementary instruction, should choose their work among the more advanced courses of the department, given below. These courses are supplemented by private reading done under the direction of the professor, as far as necessary. These more advanced courses may also be profitably pursued by students who have not done the elementary work, although some previous practical or theoretical acquaintance with that work is desirable. Students who do not intend to become practical teachers, but who elect work in this department for its culture value, are, as a rule, advised to make choice of educational history, or of that subject combined with the science of teaching. It may be added that, while the primary aim of the department is to assist students seeking to fit themselves for the work of teaching, the general culture value of the several courses is kept constantly in mind. Nothing need be said about the doctor's degree specially, except that private study will be assigned to the candidate according to the nature of the work.

Professor HINSDALE:—

History of Education: ancient and mediæval.

Recitations and lectures. Text-book: Compayré's History of Pedagogy. The subjects treated in the lectures given in this course are oriental, Greek, and Roman education, and the rise and early development of Christian schools.—*Three hours a week, first semester.*

**History of Education: modern.**

Recitations and lectures. Text-book: Compayré's History of Pedagogy. The topics dealt with in this course of lectures are the movements of modern educational thought and practice.—*Three hours a week, second semester.*

**The Comparative Study of Contemporary Educational Systems: domestic and foreign.**

Besides a general survey of the institutional organization of education in the United States, similar surveys are made of several foreign countries, as Germany, Italy, France, and England. Lectures.—*Two hours a week, second semester.*

**The Leaders of Educational Thought.**

Lectures and reading. Davidson's Aristotle and Ancient Educational Ideals. *One hour a week, second semester.*

**POLITICAL ECONOMY AND SOCIOLOGY.**

The strictly undergraduate courses in political economy represent the work of at least one academic year. These courses cover "Elements of Political Economy" and "Problems in Political Economy." For description see the University Calendar for 1895-96, pages 81 and 82.

Of the courses enumerated below, these designated as "Intermediate Courses" are open to undergraduate as well as to graduate students, but special instruction will be afforded all graduate students in connection with these courses, this special instruction being devoted to a more careful analysis and a more extended discussion than is possible in the lectures. The courses designated as "Graduate Courses" are open only to graduate students, or to undergraduates making a specialty of political economy in their senior year.

**A. INTERMEDIATE COURSES.****Professor ADAMS:—****History of the Development of Industrial Society.**

This course embraces a history of English industrial society from the twelfth century to the present time, and is designed to show how modern industrial customs and rights came into existence. As classified in the curriculum of the University of Michigan, it is regarded as introductory to all courses in political economy, and is usually taken before a study of the "Elements." It is inserted here because all advanced students do special reading upon industrial history.—*Two hours a week, first semester.*

### Transportation Problem.

This course traces the history of transportation as an industry, shows the social, industrial, and political results of modern methods of transportation, presents an analysis of the railway problem, and discusses the various solutions proposed.—*Two hours a week, second semester.* Special instruction is given in connection with this course under the direction of Dr. COOLEY.

### Seminary in Political Economy.

*First semester.*

### Seminary in Finance.

*Second semester.*

### Professor F. M. TAYLOR:—

#### History of Political Economy.

This course consists of assigned readings in political economy in connection with a study of Ingram's History of Political Economy. It is important that students who desire to specialize in economics should take this course.

#### Principles of the Science of Finance.

Under the science of finance will be included a discussion of principles of public expenditure, budgetary legislation, financial administration, public industries, and public debts.—*Two hours a week, second semester.*

#### Industrial History of the United States.

This course includes an account of the general course of industrial development, brief sketches of the leading industries, and a history of crises, the tariff, labor movements, etc. The latter part of the course will be given especially to recent industrial institutions, such as trusts, stock and produce exchanges, special forms of insurance, etc.—*Two hours a week, first semester.*

#### Money and Banking.

A mixed text-book and lecture course. The class will be examined in Jevons's Money and the Mechanism of Exchange, Upton's Money in Politics, and Dunbar's Theory and History of Banking, as well as upon the lectures. Current monetary problems will receive especial attention.—*Two hours a week, first semester.*

#### Socialism, including Communism, Collectivism, Land Nationalism, State Socialism, etc.

*Two hours a week, first semester.*

Dr. COOLEY.

### Theory of Statistics.

The earlier part of this course consists of lectures. Later, practical exercises are introduced, and during the second semester the student is expected to undertake work having in some measure the character of independent research.—*One hour a week, throughout the year.*

### Special Studies in Statistics.

*Two hours a week, second semester.*

### Principles of Sociology.

Lectures. This course aims at a systematic and comprehensive study of the underlying principles of social science. It embraces a brief historical review of the development of institutions, but is chiefly concerned with an analysis of existing society.—*Three hours a week, first semester.*

### Problems in Sociology.

This course embraces a study of the treatment of criminals, poor-relief, the assimilation of immigrants, the development of great cities, and other sociological questions of present importance.—*Three hours a week, second semester.*

### Advanced Course in Sociology.

This course will be devoted to a special study of sociological problems, and will consist of assigned readings and reports.—*Two hours a week, second semester.*

## B. GRADUATE COURSES.

The strictly advanced instruction in economics and sociology is carried on partly by lectures, partly by assigned readings and reports, and partly by formal seminars designed to give practice in research. So far as lectures are concerned, it is organized as a solid course of three hours a week for three consecutive years. The course is given jointly by Professor ADAMS, Professor F. M. TAYLOR, and Dr. COOLEY, each instructor in turn claiming the attention of students for six consecutive weeks each semester. The subjects of instruction in each case are as indicated below.

Since the chief aim of advanced instruction is to familiarize students with the process of critical analysis, the particular topics investigated during any semester are relatively unimportant. In view, however, of the fact that the most advanced degree conferred by the University calls for three years of study, it seems necessary that the special topics should

be changed each year for a series of three years. As a result of this arrangement candidates for a bachelor's degree (who are adequately prepared) are provided with one year, candidates for a master's degree with two years, and candidates for a doctor's degree with three years of specialized instruction. It will be noticed from the analysis given below that the topics covered in this specialized course have been somewhat cursorily treated in the "intermediate" or general University courses.

Professor ADAMS:—

Development and Significance of English Political Economy.

*Three hours a week, for six weeks, first semester.* This course will be omitted in 1897-99.

Comparative Study of Fiscal Institutions.

*Three hours a week, for six weeks, second semester.* This course will be omitted in 1897-99.

[Development and Significance of the Historical School of Economics.

*Three hours a week, for six weeks, first semester.* This course is omitted in 1896-97, but may be expected in 1897-98.]

[Labor Organizations and Corporations as Factors in Industrial Organization.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1896-97, but may be expected in 1897-98.]

[Development and Significance of the Austrian School of Economy.

*Three hours a week, for six weeks, first semester.* This course will be omitted in 1896-98.]

[Relation of the State to Industrial Action.

*Three hours a week, for six weeks, second semester.* This course will be omitted in 1896-98.]

Professor F. M. TAYLOR:—

The Value of Money.

Theory and statistics.—*Three hours a week, for six weeks, first semester.* This course will be omitted in 1897-99.



### The Agricultural Problem.

Treated from the comparative point of view.—*Three hours a week, for six weeks, second semester.* This course will be omitted in 1897-99.

### [Paper Money.

Government *versus* bank notes. Methods of regulation.—*Ten lectures, first semester.* This course is omitted in 1896-97, but may be expected in 1897-98.]

### [Social Philosophy, with Especial Reference to Economic Problems.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1896-97, but may be expected in 1897-98.]

### [The Standard of Value.

Different schemes historically and critically examined.—*Ten lectures, first semester.* This course will be omitted in 1896-98.]

### [Credit as a Factor in Production.

The modern institutions of credit historically and theoretically considered.—*Three hours a week, for six weeks, second semester.* This course will be omitted in 1896-98.]

Dr. COOLEY:—

### The Theory of Population.

*Three hours a week, for six weeks, first semester.* This course will be omitted in 1897-99.

### Current Changes in the Social Organization of the United States.

*Three hours a week, for six weeks, second semester.* This course will be omitted in 1897-99.

### [Aims and Methods in the Study of Society.

*Three hours a week, for six weeks, first semester.* This course is omitted in 1896-97, but may be expected in 1897-98.]

### [Relation of Sociology to other Branches of Research.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1896-97, but may be expected in 1897-98.]

## [Historical Development of Sociological Thought.

*Three hours a week, for six weeks, first semester. This course will be omitted in 1896-98.]*

## [Town and Country.

A study of the distribution of population, including the origin, function, and growth of towns and cities, and the relation of population to physical geography.—*Three hours a week, for six weeks, second semester. This course will be omitted in 1896-98.]*

## INTERNATIONAL LAW.

The courses in international law presuppose a general acquaintance with modern European history.

President ANGELL:—

## Lectures on International Law.

*Two hours a week, first semester.*

## History of Treaties.

*Two hours a week, second semester.*

## MUSIC.

Courses are given in the University, but not here enumerated, that provide instruction in the science and practice of choral music, the science of harmony, and simple and double counterpoint. The courses named below are intended for graduate students.

Professor STANLEY:—

## Canon and Fugue.

*Two hours a week, throughout the year.*

## Musical Form.

*Two hours a week, throughout the year.*

## Free Composition.

*Two hours a week, throughout the year.*

## Instrumentation.

*Two hours a week, throughout the year.*

Original work in research will be required of candidates for a doctor's degree, who take music as one of their subjects.

## MATHEMATICS.

The courses mentioned below presuppose the usual preparatory course in algebra and elementary geometry, plane, solid, and spherical, together

with two years of collegiate study devoted to trigonometry, higher algebra, plane analytic geometry, and differential and integral calculus.

#### A. PRIMARILY FOR GRADUATES.

Professor BEMAN:—

##### Solid Analytic Geometry.

Frost, with references to Salmon.—*Two hours a week, second semester.*

##### Differential Equations.

Johnson, with references to Forsyth, Boole, and Mansion.—*Three hours a week, first semester; two hours a week, second semester.*

##### Mathematical Reading.

This course is designed to give graduate students an opportunity to read standard mathematical works under the direction of the faculty.—*Three hours a week, throughout the year.*

Assistant Professor ZIWET:—

##### Advanced Mechanics.

This course is designed for students who have taken a preliminary course in mechanics involving the elementary applications of the calculus. The first part of the course is mainly devoted to the theory of the potential and its applications; the second to rigid dynamics.—*Two hours a week, first semester; three hours a week, second semester.*

Dr. GLOVER:—

##### Theory of Functions.

This course is intended to serve as an introduction to that branch of mathematics commonly known as the theory of functions. It will be chiefly concerned with the systematic development of the concept of a system of numbers (with especial reference to the system of ordinary complex numbers), and with the exposition of the properties of the elementary functions of the complex variable.—*Three hours a week, throughout the year.*

#### B. FOR GRADUATES AND UNDERGRADUATES.

Professor BEMAN:—

##### Solid Analytic Geometry.

Frost, with references to Salmon.—*Two hours a week, first semester.*

### Quaternions.

Hardy, with references to Tait and Hamilton.—*Three hours a week, second semester.*

### Teachers' Seminary.

Critical study of certain text-books in algebra and geometry, together with the discussion of methods and aims in mathematical teaching, sketches of the history of mathematics, lists of books for teachers, etc.—*Two hours a week, throughout the year.*

Assistant Professor MARKLEY:\*—

### Modern Higher Algebra.

This course is based on Burnside and Panton's *Theory of Equations*.—*Three hours a week, second semester.*

### Fourier's Series, and Spherical, Cylindrical, and Ellipsoidal Harmonics.

This course is based on Byerly's treatise.—*Two hours a week, throughout the year.*

Dr. GLOVER:—

### Projective Geometry.

This course is designed to form an introduction to the theory of the one and two dimensional geometric forms. It is intended to consider the subject first from the purely geometric point of view and then from the purely analytic point of view.—*Three hours a week, throughout the year.*

### PHYSICS.†

The courses here announced presuppose about one and a half years' collegiate work in physics; viz., a course in mechanics, sound, light, electricity, magnetism, and heat, five hours a week, for one year; a beginners' course in laboratory work, two or three hours a week for half a year; and a course in primary and secondary batteries, two hours a week for half a year.

The courses in Mathematical Electricity (Mascart and Joubert), the

\*Assistant Professor MARKLEY has leave of absence for the year 1896-97, but provision will be made for the courses offered by him.

†In the Department of Engineering advanced courses in applied physics and in electrical engineering are offered, which are open to properly qualified students in the Graduate School.

Theory of Light (Preston), the Theory of Heat (Preston), and the Advanced Laboratory Courses in Sound and in Light, are primarily for graduates; the other courses are open to undergraduates, but they are found to be beyond the work done in many colleges.

Graduate students, who are properly qualified by their previous training, have opportunity for original research in the physical laboratory under the immediate supervision of the director and his associates

Professor CARHART:—

Dynamo Electric Machinery.

*Three hours a week, second semester.*

The Alternate Current Transformer: Fleming.

*Two hours a week, first semester.*

The Theory of Heat: Preston.

*Two hours a week, first semester.*

Professor CARHART, Assistant Professor PATTERSON, and

Dr. GUTHE:—

Electrical Measurements.

*Lectures, one hour a week, throughout the year; laboratory work, three times a week, first semester; twice a week, second semester.*

Assistant Professor PATTERSON:—

Mathematical Electricity: Mascart and Joubert.

*Three hours a week, first semester; two hours a week, second semester.*

Advanced Work in Magnetism.

*Two hours a week, second semester.*

Dr. GUTHE:—

Chemical Physics and Electro-Chemistry.

Theories of solution and electrolytes, including the osmotic theory of the voltaic cell. Lectures and laboratory work.—*Three times a week, second semester.*

Dr. ST. JOHN:—

The Theory of Light: Preston.

*Lectures and recitations, two hours a week; laboratory work, twice a week, second semester.*

## Advanced Laboratory Work in Sound.

*Twice a week, first semester.*

## Advanced Laboratory Work in Light.

*Twice a week, second semester.*

## GENERAL CHEMISTRY.

The courses here announced presuppose about two years' collegiate study of general, analytical, and organic chemistry, comprising theoretical instruction and laboratory practice. The laboratory research courses are intended primarily for graduate students. The lecture courses are for graduates and advanced undergraduates, but graduates taking these courses will receive additional special instruction of one hour a week. Students taking general chemistry as a major study are required to have a reading knowledge of German and French. Research topics may be taken up in inorganic, organic, and physical chemistry; ample facilities are provided.

Professor FREER:—

## Historical and Theoretical Chemistry.

Lectures; historical readings.—*Two hours a week, first semester.*

## Chemical Literature; Journal Club.

The Journal Club discusses current chemical literature. It is under the direction of Professor FREER, but all the instructors and assistants in the department of general chemistry take part therein.—

*One hour a week, throughout the year.*

## Laboratory Research.

The work may be in either organic or inorganic chemistry.—*Hours arranged with instructor, throughout the year.*

Mr. HIGLEY:—

## Laboratory work in Inorganic Preparations.

*Hours arranged with instructor.*

## The Determination of Molecular Weights.

*Two afternoons a week, first semester.*

## Laboratory Research in Inorganic Chemistry.

*Hours arranged with instructor.*

Mr. LICHTY:—

## Laboratory work in Inorganic Preparations.

*Hours arranged with instructor.*

Laboratory work with the Polariscope and the Spectroscope.

*Hours arranged with instructor, second semester.*

Laboratory Research.

Inorganic and Physical Chemistry.—*Hours arranged with instructor.*

Dr. SHERMAN:—

Laboratory work in Inorganic Preparations.

*Hours arranged with instructor.*

Laboratory Research.

Organic or inorganic chemistry.—*Hours arranged with instructor.*

Dr. LACHMAN:—

Physical Chemistry.

Lectures.—*Two hours a week, first semester.*

Laboratory work in Physical Chemistry.

*Two mornings a week, second semester.*

Laboratory Research.

Organic and physical chemistry.—*Hours arranged with instructor.*

#### ORGANIC CHEMISTRY AND ANALYTICAL CHEMISTRY.

Graduate studies in these subjects should be preceded by undergraduate chemical work to the extent of from twenty to forty hours of credit,\* or according to the relations which chemistry is to bear to other subjects in the student's graduate work as a whole. Studies in physics are especially to be regarded in consultation upon the extent and the direction of the chemical studies. Candidates for a higher degree who take chemistry as a major study will be expected to take up an investigation, which should be in view from the beginning. All students should read chemical literature in its original sources bearing upon their work as found in the library. In the laboratory work hours can be arranged between 8 A. M. and 6 P. M.

Professor PRESCOTT, Mr. TROWBRIDGE, and Mr. DAVOLL:—

Organic Synthesis and Ultimate Analysis.

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\*Details in regard to the undergraduate courses are given in the University Calendar for 1895-96, pages 88 to 91. An "hour of credit" implies the satisfactory completion of work equivalent to one exercise a week during one semester.

Open to those who are prepared in general chemistry, primary organic chemistry, qualitative and quantitative analysis, and the initial organic preparations. Laboratory work with reading by subjects in the library.—*Hours arranged with instructors, throughout the year.*

### Chosen Subjects in Organic Chemistry.

Open to those who have had a primary lecture course and a course of laboratory work in organic chemistry.—*Lectures, twice a week, second semester.*

### Analytical Organic Chemistry.

Open to those who have had undergraduate Course 14 or its equivalent. Qualitative and quantitative work with alkaloids, fats, vegetable tissues, foods, poisons, or other organic matters.—*Hours arranged with instructors, throughout the year.*

### Investigation in Organic Chemistry.

Open to those found to be prepared. Laboratory and library work, as assigned upon consultation.—*Hours arranged with instructors, throughout the year.*

Professor JOHNSON:—

### Qualitative Analytical Chemistry.

The applicant must be able to pass examination in Courses 1 and 4 of the undergraduate studies or their equivalent. A study of qualitative methods and inorganic reactions.—*Lectures, two hours a week; laboratory work at hours arranged with instructor, second semester.*

### Investigation in Inorganic Reactions.

Open to those who have completed the last named course, or, being prepared for that course, have also a preparation for the desired research. Laboratory work and search of the authorities in the library.—*Hours arranged with instructor, throughout the year.*

Professor CAMPBELL:—

### Quantitative Analytical Chemistry.

Open to those who have had Course 4 of undergraduate studies, or its equivalent, and the chemical work required to precede it. Laboratory work in advanced quantitative analysis, with specialization in some direction suitable for the student.—*Hours arranged with instructor, throughout the year.*



### Investigation in Metallurgical Chemistry and Quantitative Methods.

Open to those who have taken the work last named, or have had equal training, applicable to the research undertaken. Work with gases may be included, also micro-metallography.—*Hours arranged with instructor, throughout the year.*

### HYGIENE AND PHYSIOLOGICAL CHEMISTRY.

The courses here announced presuppose that the student taking them is prepared for original research.

Professor VAUGHAN:—

#### Original Research on the Causation of Disease.

*Hours arranged with instructor, either first or second semester.*

Professor NOVY:—

#### Advanced Physiological Chemistry.

Laboratory work and reading.—*Hours arranged with instructor, either first or second semester.*

### ASTRONOMY.

The courses here announced presuppose acquaintance with general astronomy, analytic geometry, and calculus. For the first two courses some knowledge of mechanics is also required.

Professor HALL:—

#### Theoretical Astronomy.

Computation of orbits, correction of approximate elements, and theory of special perturbations.—*Five hours a week, throughout the year.*

#### Mathematical Theory of Planetary Motion.

Elementary treatment of general perturbations.—*Two hours a week, first semester.*

Professor HALL and Mr. TOWNLEY:—

#### Extended Practical Course in the Use of Instruments.

*Hours (at the observatory) arranged with instructors, first semester.*

Mr. TOWNLEY:—

#### Method of Least Squares and Empirical Curves.

*Two hours a week, first semester.*

## Spherical Astronomy.

*Three hours a week, throughout the year.*

## MINERALOGY.

The higher work in mineralogy presupposes an elementary knowledge of chemistry and an introductory course in mineralogy, combining theoretical instruction with practice in determining minerals. The work will be directed by Professor PETTEE.

## GEOLOGY.

The course of instruction in geology for undergraduates, as announced in the University Calendar for 1895-96, page 95, embraces two years. The first year is devoted to elementary studies in physical geology, historical geology, and physical geography, giving three hours a week to each for one semester. Le Conte's Elements of Geology and Dana's Manual of Geology are used, supplemented by lectures and exhibitions of specimens, maps, etc. During the second year more detailed instruction is given, two hours each week, in the same general subjects. Green's Physical Geology is used for reference during the first semester, supplemented by lectures and laboratory work. Each student is given a special subject for investigation in connection with which a thesis of about 2500 words is required. During the second semester palæontological studies are carried on with the aid of various treatises and laboratory work. A special subject is assigned each student and a short thesis is required.

Students in the graduate school may enter either of the advanced courses mentioned above, providing studies equivalent to the elementary courses have been pursued. Those who have done more work than is represented by the elementary course may make special arrangements for instruction and assistance in various lines of study, dependent on their tastes and acquirements. In a general course the current literature of geology will be read with special reference to Pleistocene geology, and to the origin and classification of topographic forms, glacial records, lake histories, erosion, and all of the processes by which the surface of the earth has come to have its present form.

The geological museum is being rearranged and a series of fossils selected to illustrate the life history of North America. This collection is intended especially for the use of students in the elementary courses, but may be consulted by advanced students as well. The specimens will be exhibited in the lecture room as required, and after lectures will be returned to the cases in the museum where they will be available for examination at any time.

There is a second collection embracing some ten thousand specimens of both American and European fossils, which is arranged zoologically and intended for the use of advanced students in palæontology. Special collections of rocks, brachiopods, corals, etc., numbering from one hundred and fifty to two hundred specimens each are arranged in the geological laboratory for the immediate use of students.

The collection in physical geology is small, but efforts are being made for its enlargement, and ample material will be on hand to illustrate lectures in this department. Students bringing private collections will be given an opportunity to arrange them in cases provided for the purpose, and facilities for consulting original monographs, and making comparison with specimens in the museum.

The geological laboratory is provided with apparatus for preparing thin sections of fossils and rocks, and with microscopes and photographic instruments. The laboratory is open to students from nine until five each day throughout the collegiate year.

The work in geology will be conducted by, or under the direction of, Professor RUSSELL.

### ZOOLOGY.

The courses here announced presuppose a year's work in general biology, such as is carried on in this University conjointly by the departments of botany and zoology. Following the general biology, work is provided in both invertebrate and vertebrate zoology. Candidates for the higher degrees will usually pursue both lines of work, but will find it of advantage to specialize in one of them; they will also be required to have a knowledge of the elements of physics and chemistry and some acquaintance with French and German.

In the laboratory, a description of which is given in the University Calendar for 1895-96, page 29, the student learns methods of dissection, staining, imbedding, section-cutting, graphic and solid reconstruction, and other technical methods of investigation. A library, shelved in the laboratory, contains sets of the important English and foreign periodicals, as well as many monographs, and other separate publications. It contains also an extensive collection of original papers relating to the invertebrate fauna of fresh waters. The private collections of the instructors and the library of the Department of Medicine and Surgery, which is rich in the literature of vertebrates, are also accessible to students. The original papers in connection with both lectures and laboratory work are placed in the hands of students, and special reading is required.

Graduate students will often find the elementary work in general biology of value to them, and they can rarely omit, without loss, any of the courses in zoology that are open to undergraduates.

A student who selects zoology as a *minor* for the *master's degree* may pursue the course in invertebrate morphology, vertebrate comparative anatomy, vertebrate embryology, or histology, but is not required to do work in more than one of these subjects. If zoology be chosen as a *major*, work may be taken in invertebrate morphology and at the same time in any two of the branches of vertebrate morphology named above. For any of these branches the student may substitute research work, and such substitution is advised for those who do not intend to become candidates for the doctor's degree.

The work outlined for those who elect zoology as a major for the master's degree is suitable for candidates for the *doctor's degree* who elect this subject as a *minor*.

Those electing zoology as a *major* for the *doctor's degree* are expected to complete all the courses offered. During the first part of his term of residence at the University, the candidate should devote his time to these courses and to the completion of work on the minors. In his second year of residence, in addition to completing the work mentioned, he is expected to repeat a designated piece of research work in order to acquaint himself with methods of investigation. At the same time he does assigned reading on the more important problems of zoology and on zoological history and theory. At the least one year must be devoted to the research which is to be embodied in the doctor's dissertation.

Those electing zoology as a major, will find it of advantage to select as one minor either botany, physiology, systematic zoology, palæontology, or physiological psychology. Less closely related is work in bacteriology, physiological and organic chemistry, and geology.

#### A. PRIMARILY FOR GRADUATES.

Professor REIGHARD:—

#### Current Literature of Zoology.

The instructors and advanced students hold weekly meetings at which reports are made on important current papers, followed by informal discussion. Although the meetings are open to all, the membership is restricted.—*One hour a week, throughout the year.*

Research work in zoology, invertebrate morphology, and vertebrate comparative anatomy, embryology, and histology.

Definite problems are assigned and worked out under the constant supervision of the instructor. The locality affords exceptional advantages for work on vertebrate embryology (Petromyzon, several Teleosts, Amia, Acipenser, Amblystoma, and other forms are under con-

trol) and for faunistic or experimental studies on invertebrates. Students intending to begin this work should confer with the professor in charge as early as the preceding spring in order that they may have time in which to prepare necessary material.—*Hours arranged with instructor, throughout the year.*

Assistant Professor HUBER:—

### Microscopic Anatomy of the Brain and Special Sense Organs.

This course presupposes a knowledge of mammalian (or human) anatomy, including dissection. It must be preceded or accompanied by a course in microscopic technique. Work in vertebrate embryology, though not indispensable, is advised.—*Five hours a week, first or second semester.*

#### B. FOR GRADUATES AND UNDERGRADUATES.

Professor REIGHARD:—

### The Comparative Embryology and Anatomy of Vertebrates.

The work in embryology, which precedes the anatomy, begins with a study of the early stages of fishes and amphibia and concludes with detailed work on the chick and the rabbit. In anatomy a few type forms are dissected and preparations of other forms are studied. The lectures are illustrated by charts and preparations especially designed for the purposes of this course.—*Five hours a week, throughout the year.*

This work may be advantageously preceded by the undergraduate courses in mammalian anatomy and histology (Courses 4, 5, 6, and 7, University Calendar for 1895-96, pages 97, 98) though these courses are not required.

### Field Club.

Field excursions and laboratory work, with occasional lectures. The work will consist of the careful collection, identification, preservation and study of specimens of the local fauna. In the conduct of this course Assistant Professor WORCESTER and Dr. LILLIE will also have part.

Assistant Professor WORCESTER:—

### Museum Work.

Students desiring to carry on systematic work on special groups represented in the University Museum, will be given every opportunity to do so, but must first satisfy the instructor in charge of their fitness to pursue the work.—*Either first or second semester.*

Assistant Professor HUBER:—

**Vertebrate Histology.**

Lectures and laboratory work, with instruction in methods.—*Five hours a week, first or second semester.*

**Methods of Vertebrate Histology.**

Laboratory work with reading.—*Two hours a week, second semester.*

Dr. LILLIE:—

**Invertebrate Morphology.**

The lectures treat of the comparative anatomy and ontogeny of invertebrates. The laboratory work includes a series of forms which supplements that studied in the course in general biology. Students are required to prepare and deliver lectures on assigned topics.—*Five hours a week, first semester.*

**Experimental Morphology.**

The lectures review recent experimental work in embryology and show the bearing of the results on theories of heredity.—*One hour a week, second semester.*

By special arrangements this course may be extended to *three hours a week*, and will then include laboratory work. A laboratory has been fitted up especially for this work.

Mr. ———:—

**Mammalian Anatomy.**

Dissection of the cat, with class-meetings twice a week for quizzes on the anatomy of the cat and for such lectures as may be necessary. It is the purpose of the course to afford a training in mammalian anatomy which shall be substantially equivalent to the training which the medical student receives in human anatomy. This training gives that mastery of anatomical facts and that knowledge of anatomical technique, which are believed to furnish the most satisfactory basis for the study of human or comparative anatomy. The class makes use of type-written copies of a descriptive anatomy of the cat prepared by Professor REIGHARD.—*Five times a week, throughout the year.*

**BOTANY.**

**A. PRIMARILY FOR GRADUATES.**

Professor SPALDING and Assistant Professor NEWCOMBE:—

**Investigations in Morphology and Physiology.**

*Throughout the year.*

## B. FOR GRADUATES AND UNDERGRADUATES.

The equivalent of a full year in the study of botany is required for admission to any of the courses named below, all of which consist largely of laboratory work.

Professor SPALDING:—

Morphology and Physiology of Fungi.

Lectures and laboratory work.—*Five hours a week, first semester.*

Plant Morphology.

Aside from the laboratory work, there will be lectures and reading directed toward the principles of relationship and classification, the important biological problems with their physiological bearing, and the development of the science of botany.—*Three hours a week, second semester.*

Current Literature of Botany.

Important papers on botany are reviewed and discussed.—*One hour a week, throughout the year.*

Assistant Professor NEWCOMBE:—

Cell Morphology and Physiology.

The application of finer methods to biological research; cell structure, organization, and activity; mitosis; heredity; the cell theory. Lectures and laboratory work.—*Five hours a week, first semester.*

Experimental Physiology of Plants.

A laboratory study of the relations of plants to their environment, as manifested by the phenomena of nutrition, growth, and irritability. *Five hours a week, second semester.*

PHYSIOLOGY.

The advanced work in physiology presupposes a knowledge of mammalian anatomy, including histology, and the elements of physics and chemistry. The required training is to be got from such courses as 4 and 5 in animal morphology (or courses in descriptive human anatomy and practical anatomy), 1 and 2 in physics, 1, 2, and 4 in general chemistry, and 10 in organic chemistry (described in the University Calendar for 1895-66, pages 85 to 98). Ability to read German is indispensable, and French is desirable, for students taking physiology as a major study for an advanced degree, though in some cases a candidate may be considered qualified to begin his advanced work prior to the completion of these requirements.

Professor LOMBARD:—

Lectures and Recitations.

*Five hours a week, throughout the year.*

Laboratory Course.

*Three times a week, one-third of a semester.*

Physiological Experimentation.

*One hour a week, one semester.*

Physiological Research and Collateral Reading.

Arranged to meet the wants of students who take physiology as a major study.



# Catalogue of Students in 1895-96.\*

## RESIDENT GRADUATES.

| NAME.                                                                                                                               | RESIDENCE.                   |
|-------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Charles Wallace Adams, A.B., 1894,<br>Political Economy; American History; European History.                                        | <i>Ann Arbor.</i>            |
| Warren Babcock, Jr., B.S., <i>Mich. Agr. Coll.</i> ,<br>1890,<br>Mathematics; Astronomy; Mechanics.                                 | <i>Agricultural College.</i> |
| †Samuel Herman Baer, B.S., 1896,<br>Organic Chemistry; Analytical Chemistry; Physics.                                               | <i>Fort Smith, Ark.</i>      |
| Mary Bartol, A.B., <i>Bucknell Univ.</i> , 1894, A.M.,<br><i>ibid.</i> , 1895,<br>Greek; Italian; French.                           | <i>Lewisburg, Pa.</i>        |
| *John Fletcher Byington, A.B., 1895,<br>Mathematics; General Chemistry; Physiological Chemistry.                                    | <i>Battle Creek.</i>         |
| Spencer Peter Carmichael, Ph.B., <i>Lafayette</i><br><i>Coll.</i> , 1893,<br>Physics; Mathematics; Chemistry.                       | <i>LeRoy, N. Y.</i>          |
| Lawrence Thomas Cole, A.B., 1892, S.T.B.,<br><i>General Theological Seminary</i> , 1895,<br>History of Philosophy; Ethics; History. | <i>Ann Arbor.</i>            |
| Samuel Richard Cook, B.S., 1895,<br>General Chemistry; Physics; Astronomy.                                                          | <i>Ann Arbor.</i>            |
| Carl Herbert Cooper, A.B., <i>Upper Iowa Uni-</i><br><i>versity</i> , 1895,                                                         | <i>Quasqueton, Ia.</i>       |
| *Arnold Lyman Davis, A.B., <i>University of</i><br><i>South Dakota</i> , 1895,<br>Sociology; Political Economy; International Law.  | <i>Watertown, S. Dak.</i>    |
| William Eli Davis, B.S., <i>Mich. Agr. Coll.</i> ,<br>1889,                                                                         | <i>Wacousta.</i>             |

\*The principal subjects of study pursued by candidates for an advanced degree are indicated under their respective names.

An asterisk (\*) before a student's name indicates that the student is also pursuing studies in the Department of Medicine and Surgery or in the Department of Law.

A dagger (†) indicates that the student was admitted to the Graduate School at the beginning of the second semester, on completion of the requirements for the bachelor's degree indicated in each case, though the degree was not to be conferred until the end of the year.

- Physics; Mathematics; General Chemistry.  
 Earle Wilbur Dow, A.B., 1891, *Ann Arbor.*  
 European History; Industrial History; Sociology.  
 Peter William Dykema, B.L., 1895, *Grand Rapids*  
 English Literature; Rhetoric; French.  
 \*Lucy Nash Eames, B.S., 1895, *Ann Arbor.*  
 Physiology; Histology; Physiological Chemistry.  
 Wallace Stedman Elden, A.B., *Bowdoin Coll.*,  
 1889, A.M., *ibid.*, 1892, *Ann Arbor.*  
 French; Latin; Spanish.  
 Charles Franklin Emerick, A.B., *Wittenberg*  
*Coll.*, 1889, M.S., *Mich. Agr. Coll.*, 1891,  
 Ph.M., 1895, *Ann Arbor.*  
 Political Economy; History; Sociology.  
 Oliver D. Frederick, B.S., *West Chester Normal*  
*School*, 1895, *West Chester, Pa.*  
 Mathematics; Physics; Pedagogy.  
 \*†Conrad Georg, A.B., 1896, *Ann Arbor.*  
 Physiological Chemistry; Histology; Physiology.  
 Willard Clark Gore, Ph.B., 1894, Ph.M., 1895, *Ann Arbor.*  
 Rhetoric; English Literature; Philosophy.  
 Charles Henry Gray, B.L., 1895, *Ann Arbor.*  
 English Literature; Rhetoric; Pedagogy.  
 George Depue Hadzsits, A.B., 1895, *Detroit.*  
 Greek; Latin; Music.  
 Jacob George Halaplian, A.B., 1894, *Saginaw, West Side*  
 Hebrew; Assyrian; Hellenistic Greek.  
 Arthur Graham Hall, B.S., 1887, *Ann Arbor.*  
 Physics; Mechanics; Heat.  
 Walter Monroe Hamilton, A.B., 1894, *Ann Arbor.*  
 Mathematics; Physics; Astronomy.  
 Clemma Belle Hayes, A.B., 1893, *Erie, Pa.*  
 American History; European History; Political Economy.  
 Wilbur Olin Hedrick, B.S., *Mich. Agr. Coll.*,  
 1891, M.S., 1895, *Agricultural College*  
 Political Economy; Finance; History.  
 Elizabeth C. Hensch, Ph.B., 1895, *Carlisle, Pa.*  
 Ellen Clara Hogeboom, B.S., 1877, M.S., 1895, *Saginaw, West Side*  
 Samuel Allen Jeffers, A.B., *Central Wesleyan*  
*Coll.*, 1892, *New Florence, Mo.*  
 Latin; Psychology; Pedagogy.  
 John Black Johnston, Ph.B., 1893, *Ann Arbor.*  
 Animal Morphology; Physiological Psychology; Physiology.  
 Riotoaro Kodama, *Doshisha Coll.*, *Wakayama, Japan.*

- Arthur Lachman, B.S., *Univ. of California*,  
1893, PH.D., *Univ. of Munich*, 1895,  
*Holder of the Parke, Davis and Company*  
*Fellowship in Chemistry.* *San Francisco, Cal.*
- †Fanny Elizabeth Langdon, B.S., 1896, *Plymouth, N. H.*  
Botany; Invertebrate Morphology; Experimental Embryology.
- John Edward Lautner, B.L., 1895, *Traverse City.*  
American Literature; Rhetoric; German.
- Otto Edward Lessing, A.B., 1895, *Ofterdingen, Wurtem-*  
*berg.*  
German; English Literature; Old English.
- Laura Alberta Linton, B.S., *University of Min-*  
*nesota*, 1879, *Minneapolis, Minn.*
- \*Anna Willard Locke, A.B., *Wellesley College*,  
1892, *Nashua, N. H.*  
Bacteriology; Physiological Chemistry; Histology.
- Almira Lovell, A.B., 1884, *Flint.*  
Latin; Greek; Classical Archæology.
- Albert Brown Lyons, A.B., *Williams Coll.*,  
1865, M.D., 1868, *Honolulu, H. I.*
- Charles Edward Marshall, Ph.B., 1895, *Fredonia, N. Y.*  
Bacteriology; Hygiene; Organic Chemistry.
- \*Walter Park Martindale, Ph.B., 1894, *Fulton, Ill.*  
United States Constitutional History; Political Economy; Mathematics.
- †Agnes May Mason, Ph.B., 1896, *Streator, Ill.*
- \*David Porter Mayhew, Ph.B., 1893, *Detroit.*  
Physiology; Bacteriology; Physiological Chemistry.
- Mary McPherson, A.B., *Wellesley Coll.*, 1893, *Washington, D. C.*  
A.M., *Columbian Univ.*, 1895,  
Vertebrate Morphology; Bacteriology; Embryology.
- Ernst Heinrich Mensel, A.B., *Carthage Coll.*,  
1887, A.M., *ibid.*, 1890, *Ann Arbor.*  
Germanic Philology; German Literature; Old English.
- Frank Wesley Nagler, B.S., 1892, *Ann Arbor.*  
Physics; Organic Chemistry; Analytical Chemistry.
- Ralph Winthrop Newton, B.S., 1894, *Ann Arbor.*
- Walter Hammond Nichols, B.S., 1891, *Ann Arbor.*  
Political Economy; Sociology; History.
- Jesse Francis Orton, A.B., 1893, A.M., *Cornell*  
*Univ.*, 1895, *Ann Arbor.*  
Political Economy; Science of Jurisprudence; Constitutional Law
- †Lewis Merton Parrott, B.S., 1896, *Mt. Clemens,*  
Mathematics; Physics; Pedagogy.

- Walter Thomas Peirce, A.B., *Ohio Wesleyan Univ.*, 1894, *South Charleston, O.*  
French; English Literature; Italian.
- Marian Williams Perrin, A.B., *Wellesley Coll.*, 1891, *Rochester, N. Y.*  
English Literature; Rhetoric; Philosophy.
- Clayton Amos Peters, B.S., 1895, *Ann Arbor.*  
Botany; Experimental Vegetable Physiology; Animal Embryology
- John Burton Phillips, A.B., *Indiana Univ.*, 1889, *Lansing.*  
A.M., *ibid.*, 1891,  
Political Economy; Sociology; Finance.
- James Barkley Pollock, B.S., *Univ. of Wisconsin*, 1893, *Orangeville, Ill.*  
Botany; Experimental Vegetable Physiology; Organic Chemistry.
- Melvin Park Porter, A.B., 1893, A.M., 1894, *West Sunbury, Pa.*  
General Psychology; Experimental Psychology; Hebrew.
- Carlton Raymond Rose, Ph.B., 1894, *Ann Arbor.*  
General Chemistry; Organic Chemistry; Analytical Chemistry.
- Fannie Ellis Sabin, Ph.B., 1895, *Illinsdale, Ill.*  
Latin; Classical Archæology; Roman Political Institutions.
- †James Herbert Scott, A.B., 1896, *St. Louis.*  
Greek; Latin; English Literature.
- Thomas Chalkley Severance, A.B., 1889, A.M., 1893, *Walled Lake.*  
English Literature; Rhetoric; Ethics.
- John Ray Sherrick, Ph.B., *Earlham College*, 1885, *Ypsilanti.*  
Latin; Classical Archæology; Pedagogy.
- Sibyl Stanley, B.S., *Earlham College*, 1897, *Adrian.*
- †Ada Stewart, A.B., 1896, *Peoria, Ill.*
- Caroline Maria Taylor, A.B., *Kalamazoo College*, 1894, *Kalamazoo.*  
European History; American History; Rhetoric.
- Orrin Edward Tiffany, A.B., 1895, *Spring Arbor.*  
United States History; Finance; European History.
- Ira Dudley Travis, Ph.B., *Albion College*, 1889, *Ann Arbor.*  
Ph.M., 1894,  
American History; Political Economy; European History.
- Mary Etta Trueblood, Ph.B., *Earlham College*, 1893, *Jamestown, O.*  
Mathematics; German; Astronomy.
- †Agnes Mary Warren, Ph.B., 1896, *Springfield, Ill.*  
Latin; History; English Literature.

- Arletta Leora Warren, Ph.B., *University of Wooster*, 1889, *Wooster, O.*  
 Royal Brunson Way, Ph.B., *Albion College*, 1894, *Elsie.*  
 American History; Political Economy; Comparative Constitutional Law.  
 †Christian Friedrich Weiser, A.B., 1896, *Three Rivers.*  
 Howard White, Jr., B.S., *Swarthmore College*, 1895, *Lansdowne, Pa.*  
 Mathematical Electricity; Heat and Light; Mechanical Engineering.  
 Mary Gilmore Williams, A.B., 1895, *Holder of the Elisha Jones Classical Fellowship*, *Corning, N. Y.*  
 Latin; Greek; Political Economy.  
 Eugene Cyrus Woodruff, B.S., 1894, *Ludington.*  
 Chemistry; Physics; Music.

### CANDIDATES FOR A MASTER'S DEGREE, STUDYING IN ABSENTIA.

- | NAME.                                                                                                                | RESIDENCE.                  |
|----------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Allen Lysander Colton, Ph.B., 1889, A.B., 1890,<br>Astronomical Photography; Optics; Practical Astronomy.            | <i>Mount Hamilton, Cal.</i> |
| Joseph Villiers Denney, A.B., 1885,<br>English Literature; Rhetoric; Philosophy.                                     | <i>Columbus, O.</i>         |
| Humphrey Snell Gray, A.B., 1893, LL.B., 1894,<br>Constitutional Law; Political Economy; History.                     | <i>Ludington.</i>           |
| Frank Addison Manny, A.B., 1893,<br>American Literature; European History; English Literature.                       | <i>Moline, Ill.</i>         |
| Alfred Berthier Olsen, M.D., 1894, B.S., 1895,<br>Histology; Bacteriology; Physiological Chemistry.                  | <i>Battle Creek.</i>        |
| Esther Lakin Sanborn, A.B., 1895,<br>Greek; German; History.                                                         | <i>West Roxbury, Mass.</i>  |
| Bernard Benjamin Selling, Ph.B., 1894, LL.B.,<br>1895,<br>Constitutional Law; International Law; English Literature. | <i>Detroit.</i>             |
| Lillie Maria Shaw, A.B., 1884,<br>Greek; German; Botany.                                                             | <i>Saginaw, East Side.</i>  |
| Katharine Eliza Sumner, Ph.B., 1891,<br>English Literature; History; Pedagogy.                                       | <i>Toledo, O.</i>           |



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UNIVERSITY OF MICHIGAN

DEPARTMENT OF LITERATURE, SCIENCE, AND THE ARTS

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# GRADUATE SCHOOL

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## ANNOUNCEMENT

FOR

1897-98

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ANN ARBOR, MICHIGAN  
PUBLISHED BY THE UNIVERSITY  
1897





UNIVERSITY OF MICHIGAN  
DEPARTMENT OF LITERATURE, SCIENCE, AND THE ARTS

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# GRADUATE SCHOOL

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ANNOUNCEMENT

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ANN ARBOR, MICHIGAN  
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## CALENDAR.

1897.

Sept. 23-28. *Examination for Admission to the Department of Literature, Science, and the Arts.*

Oct. 1. FIRST SEMESTER BEGINS IN ALL DEPARTMENTS OF THE UNIVERSITY.

Nov. Thanksgiving Recess of three days, beginning Tuesday evening, in all Departments of the University.

Dec. 17. (Evening.) Holiday Vacation begins in all Departments.

1898.

Jan. 4. Exercises Resumed.

Feb. 18. (Evening.) FIRST SEMESTER CLOSES.

Feb. 21. SECOND SEMESTER BEGINS.

April 15. (Evening.) Recess begins, ending April 25 (evening).

June 30. COMMENCEMENT IN ALL DEPARTMENTS OF THE UNIVERSITY.

## ADMINISTRATIVE COUNCIL.

\*JAMES B. ANGELL, LL.D., *President.*

HARRY B. HUTCHINS, PH.B., *Professor of Law, and Acting President.*

ALBERT B. PRESCOTT, M.D., LL.D., *Director of the Chemical Laboratory, and Professor of Organic Chemistry.*

REV. MARTIN L. D'OOGHE, LL.D., *Professor of the Greek Language and Literature.*

WILLIAM H. PETTEE, A.M., *Professor of Mineralogy, Economic Geology, and Mining Engineering.*

EDWARD L. WALTER, PH.D., *Professor of Romance Languages and Literatures.*

ISAAC N. DEMMON, LL.D., *Professor of English and Rhetoric.*

ALBERT H. PATTENGILL, A.M., *Professor of Greek.*

WOOSTER W. BEMAN, A.M., *Professor of Mathematics.*

VICTOR C. VAUGHAN, PH.D., Sc.D., M.D., *Professor of Hygiene and Physiological Chemistry, and Director of the Hygienic Laboratory.*

HENRY S. CARHART, LL.D., *Professor of Physics, and Director of the Physical Laboratory.*

VOLNEY M. SPALDING, PH.D., *Professor of Botany.*

\*HENRY C. ADAMS, PH.D., *Professor of Political Economy and Finance.*

BURKE A. HINSDALE, LL.D., *Professor of the Science and the Art of Teaching.*

RICHARD HUDSON, A.M., *Professor of History.*

ALBERT A. STANLEY, A.M., *Professor of Music.*

FRANCIS W. KELSEY, PH.D., *Professor of the Latin Language and Literature.*

OTIS C. JOHNSON, PH.C., A.M., *Professor of Applied Chemistry.*

PAUL C. FREER, PH.D., M.D., *Professor of General Chemistry, and Director of the Laboratory of General Chemistry.*

ANDREW C. McLAUGHLIN, A.M., LL.B., *Professor of American History.*

ASAPH HALL, JR., PH.D., *Professor of Astronomy, and Director of the Observatory.*

ISRAEL C. RUSSELL, C.E., LL.D., *Professor of Geology.*

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\*Absent on leave for the year 1897-98.

WARREN P. LOMBARD, A.B., M.D., *Professor of Physiology and Histology.*

JACOB E. REIGHARD, PH.B., *Professor of Zoology, and Director of the Zoological Laboratory and the Zoological Museum.*

THOMAS C. TRUEBLOOD, A.M., *Professor of Elocution and Oratory.*

JAMES A. CRAIG, PH.D., *Professor of Semitic Languages and Literatures and Hellenistic Greek.*

JOHN C. ROLFE, PH.D., *Professor of Latin.*

ROBERT M. WENLEY, Sc.D., D. PHIL., *Professor of Philosophy.*

ELIZA M. MOSHER, M.D., *Professor of Hygiene.*

GEORGE A. HENCH, PH.D., *Professor of Germanic Languages and Literatures.*

FREDERICK G. NOVY, Sc.D., M.D., *Junior Professor of Hygiene and Physiological Chemistry.*

GEORGE HEMPL, PH.D., *Junior Professor of English.*

EDWARD D. CAMPBELL, B.S., *Junior Professor of Analytical Chemistry.*

FRED M. TAYLOR, PH.D., *Junior Professor of Political Economy and Finance.*

FRED N. SCOTT, PH.D., *Junior Professor of Rhetoric.*

ALEXANDER ZIWET, C.E., *Junior Professor of Mathematics.*

FREDERICK C. NEWCOMBE, B.S., PH.D., *Assistant Professor of Botany.*

ALFRED H. LLOYD, PH.D., *Assistant Professor of Philosophy.*

CHARLES H. COOLEY, PH.D., *Instructor in Sociology.*

# ANNOUNCEMENT OF THE GRADUATE SCHOOL.

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## GENERAL INFORMATION.

### **The University of Michigan.**

The University of Michigan is a part of the educational system of the State, and derives from the State, in one way or another, the greater part of its revenue. The University comprises the Department of Literature, Science, and the Arts, and six professional schools, each of which has its own Faculty and issues each year a separate departmental Announcement. In the several faculties there were, in 1896-97, one hundred and thirty-three officers of instruction besides numerous assistants, some of whom participated in the work of teaching. Including the Summer Schools, nearly three thousand students, representing forty-seven States and Territories, and fifteen foreign countries, were in attendance.

### **The Department of Literature, Science, and the Arts.**

In the Department of Literature, Science, and the Arts, the aim is to cover the broad field of general university study of the ancient and the modern languages and literatures, of history, philosophy, science, and the liberal arts, as distinguished from the more special work of the professional schools. Its faculty numbered, in 1896-97, eighty-one regular teachers, and fourteen assistants. The students in attendance numbered nearly thirteen hundred, of whom seventy-six were graduates. The presence of such a number of graduate students, taken with the fact that high specialization of work is not uncommon among undergraduates, tends to create a genuine university atmosphere, and to assure the advanced student of intellectual comradeship.

### **The Libraries.**

The various libraries of the University contain more than 105,000 volumes, and include a number of important special collections. Among these are the McMillan Shakespeare Library, 4,001 volumes; the Parsons

Library (political science), 4,325 volumes; the Hagerman Collection (history and political science), 2,660 volumes, and the Goethe Library of 905 volumes. The general reading room seats two hundred and ten readers, and separate rooms are provided for advanced students to work in, with the necessary books close at hand. Under certain restrictions graduate students have access to the book rooms. The library takes five hundred and forty-six periodicals, and is open, in term time, fourteen hours daily, except on Sundays and legal holidays. During the summer vacation it is open nine hours a day for the six weeks of the Summer School, and six hours a day for the remainder of the time.

### **The Laboratories.**

The University has an observatory and a large number of laboratories more or less fully equipped for routine instruction and for original research. These laboratories (omitting those connected exclusively with the work of the Engineering, Medical, and Dental Schools) are: the Botanical, Chemical, Geological, Histological, Hygienic, Physical, Physiological, Psychological, and Zoological. For a fuller account of them and their various resources, as also of the University collections for the study of art, archæology, ethnology, mineralogy, palæontology, systematic zoology, etc., consult the annual Calendar, which may be had gratis on application to Mr. James H. Wade, Secretary of the University.

### **Societies.**

There are connected with the University a number of voluntary literary, philosophical, and scientific organizations which add not a little to the graduate student's opportunities for general training. The membership of these societies consists usually of University teachers and advanced students who are pursuing a common specialty. They are variously organized and meet weekly, fortnightly, or monthly, as the case may be, for the reading and discussion of formal papers, for reports upon observation and experiment, reviews of recent literature, etc.

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## **ORGANIZATION OF GRADUATE WORK.**

### **The Graduate School.**

The Graduate School was organized in the Spring of 1892 in connection with the Department of Literature, Science, and the Arts. Its purpose is to bring into increased prominence the numerous advanced courses offered in that department—courses that have developed during

the past few years from the continual extension of the elective system,—and to recognize and announce them as something distinct from the work of an ordinary college course. It aims to make provision for a more systematic and efficient administration of this higher work, and, so far as possible, for the separate instruction of graduate students. It also aims to lay foundations for the future development of university (as distinguished from collegiate) work. The management of the School is entrusted to an Administrative Council, of which the President of the University is chairman.

The regulations of the University respecting graduate work, that were formerly in force, have been modified in a few particulars by the Council, and it is possible that still further changes may be made in the year to come. The more important of these regulations are explained in the pages that follow.

### **The University System.**

Every graduate student who is a candidate for a higher degree, works upon the so-called 'university system,' the essential features of which are specialization of study, a final examination, and a thesis. The student selects a 'major study' and, in general, two 'minor studies,' his selection being subject, however, to the approval of the Council. When the choice has been made and approved, the student's work is henceforth under the immediate supervision of a committee consisting of those professors who have charge of the studies chosen, the one having charge of the major study being chairman. This committee arrange a course of study suited to the desires, needs, and previous attainments of the student, assist him in the choice of a subject for a thesis, pass judgment upon his thesis when it is written, conduct his examination, and, if he passes, report him to the Council as worthy of the degree sought. The nature of the work prescribed, and of the committee's oversight, varies more or less according to the subjects chosen, the degree sought, and the previous attainments of the student. The work may consist of attendance upon certain specified courses of study, of reading to be done privately and reported upon, or of an original research to be carried on more or less independently. The requirement of a thesis is sometimes waived in the case of a candidate for a *master's* degree. It may be added also that for the master's degree the Council may, at their discretion, approve a course of study which does not confine the candidate rigorously to a major and two minor studies.

Graduate students who do not wish to work for a higher degree are admitted to any course offered in the Department of Literature, Science, and the Arts, upon satisfying the professor in charge that they are qualified to pursue the work to advantage.

## ANNOUNCEMENT OF THE THE HIGHER DEGREES.

### Degrees Conferred.

The degrees conferred on the completion of approved courses of study in the Graduate School are those of Master of Arts, Master of Philosophy, Master of Science, Master of Letters, Doctor of Philosophy, and Doctor of Science.

### The Masters' Degrees.

A Bachelor of this University, or of any other reputable university or college, may become a candidate for the corresponding master's degree, and may be recommended for the degree after one year's residence at the University, provided he pass a satisfactory examination on the course of study approved by the Administrative Council. A thesis may, or may not, be included in the requirements for a degree, as the committee in charge of the student's work may determine.

The practice of allowing graduates of this University to enter upon studies *in absentia* as candidates for a master's degree, has been discontinued. But a graduate who has already completed a considerable portion of the term of residence prescribed for a master's degree, may be allowed to continue his studies for the degree, without further residence at the university, on such conditions as the Administrative Council may determine in each case. *This privilege is restricted to graduates of this University.*

A student properly qualified may be permitted to pursue at the same time studies for a master's degree, and studies in any of the professional schools, on condition that the term of study and residence in the Graduate School be extended to cover at least two years.

### The Doctors' Degrees.

1. The degree of Doctor of Philosophy is open to all persons who have received a bachelor's degree; those persons, however, who pursue studies along scientific lines, may at their option receive the degree of Doctor of Science; but no student will be accepted as a candidate for the doctor's degree who has not a knowledge of French and German sufficient for purposes of research.

2. It is not intended that the doctors' degrees shall be won merely by faithful and industrious work for a prescribed time in some assigned course of study, and no definite term of required residence can be specified. As a rule, three years of graduate study will be necessary, the last two semesters of which must be spent at this University. The period of three years, however, may be shortened in the case of students who, as undergraduates, have pursued special studies in the direction of their proposed graduate work.



3. No student will be enrolled as a candidate for a doctor's degree until he has been in residence as a graduate student for at least one year. [This rule may be waived in the case of those who come properly accredited from a Graduate School of some other University, and of those who, as undergraduates in this University, have shown special proficiency in the line of their proposed graduate work.]

4. A student wishing to become a candidate for a doctor's degree must make a formal application to be so enrolled at least two semesters prior to the time of presenting himself for examination.

5. A candidate for a doctor's degree must take a major study that is substantially co-extensive with some one department of instruction in the University. He must also take two minor studies, one of which may be in the same department as the major, but involving a more thorough treatment of the same. Both minors must be cognate to the major, and all studies must be subject to the approval of the Administrative Council.

6. **THE THESIS.**—The thesis is of great importance. It must exhibit creditable literary workmanship and a good command of the resources of expression, but it must depend for acceptance more upon its subject-matter than upon its formal or rhetorical qualities. It must be an original contribution to scholarship or to scientific knowledge. The inquiry should be confined within narrow bounds. The treatment should be as concise as the nature of the subject permits, and show familiarity with the history of the problem treated, with the literature bearing upon it, and with the latest methods of research applicable to it. Every thesis should contain a clear introductory statement of what it is proposed to establish or investigate, and likewise a final résumé of results. It should also be accompanied by an index of contents and a bibliography of the subject. It is expected that the preparation of an acceptable thesis will usually require the greater part of one academic year.

#### **Special Regulations Relating to the Higher Degrees.**

1. Applicants for an advanced degree are required to announce to the Council, through the Secretary, as early as the fifteenth of October of each year, the particular branches of study to which they wish to give special attention. The supervision of their work will then be entrusted to the proper committee.

2. The subject of the thesis for a doctor's degree must be chosen, and must be approved by the committee concerned, as early as the first of November of the college year in which the applicant expects to take his degree, and the subject of the thesis, when required for a master's degree, must be chosen and approved as early as the first of December.

3. The thesis must be completed and put into the hands of the chairman of the proper committee as early as the first of May of the year in which the applicant expects to take the degree.

4. The thesis must be prepared for close scrutiny with reference not only to its technical merits, but also to its merits as a specimen of literary workmanship. It must be preceded by an analytical table of contents, and a carefully prepared account of the authorities made use of.

5. The thesis must be read and defended in public at such time as the Council may appoint; and, in case of a master's degree, a bound copy, either written or printed, must be deposited in the University library.

6. Candidates for the degree of Doctor of Philosophy or Doctor of Science, in case of the acceptance of their theses, are required to have the accepted theses printed, in full or in part as may be approved by the responsible committee, and to present twenty-five copies of the same to the University library. To guarantee the printing of the thesis every candidate for a doctor's degree will be required to deposit with the Treasurer of the University, between the date of the acceptance of his thesis and the time fixed for his examination, the sum of fifty dollars, which deposit will be returned to him in case of failure to pass his examination, or whenever he shall cause his thesis to be printed at his own expense, or shall have it published in a form and under auspices approved by the responsible committee.

In the printing of the thesis at his own expense the candidate will be expected to use good substantial paper and slightly typography. A page four inches by six, with outside margins of at least one inch, is recommended.

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## ADMISSION AND REGISTRATION.

All applicants for admission to the Graduate School must first report to the Dean of the Department of Literature, Science, and the Arts, and present their credentials. They will then be referred to the Secretary of the Administrative Council for the arrangement of courses of study.

The privileges of the school are open to graduates of the Department of Literature, Science, and the Arts of this University, and to graduates of other universities and colleges who satisfy the Administrative Council that they are qualified to pursue with profit the advanced courses of study offered in the school.

Graduates of institutions where the undergraduate courses of study are not substantially equivalent to the course prescribed at this University will ordinarily be required to do an additional amount of undergraduate work, or to prolong their term of residence, before being admitted to full candidacy for a higher degree.

Graduates of this University, or of other institutions, who do not wish to become candidates for a degree, may be admitted and registered as special resident graduates.

Graduates of other institutions who are candidates for a bachelor's degree in the Department of Literature, Science, and the Arts, are not registered in the Graduate School.

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## FEES AND EXPENSES.

**Matriculation Fee.**—Every student before entering any department of the University is required to pay a matriculation fee. This fee, which for citizens of Michigan, is ten dollars, and for those who come from any other state or country, twenty-five dollars, is paid but once, and entitles the student to the privileges of permanent membership in the University.

**Annual Fee.**—In addition to the matriculation fee, every student has to pay an annual fee for incidental expenses. This fee in the Department of Literature, Science, and the Arts is, for Michigan students, thirty dollars; for all others, forty dollars. It is paid the first year of residence at the University, and every year of residence thereafter. Resident graduates are required to pay the same annual fee as undergraduates. Graduate students studying *in absentia* for a master's degree pay an annual fee of ten dollars.

The matriculation fee and the annual fee must be paid at the beginning of the academic year. A by-law of the Board of Regents provides that no student or graduate shall be allowed to enjoy the privileges of the University until he has paid all fees that are due.

**Laboratory Expenses.**—Students who pursue laboratory courses of study are required to pay for the materials and apparatus actually consumed by them. The deposits required in advance are different in the different courses, ranging from one to twenty dollars. The laboratory expenses of students will vary with their prudence and economy. Experience has shown that in the chemical laboratory the average expense for all courses is about one dollar and twenty cents a week.

**Diploma Fee.**—The fee for the diploma given on graduation is ten dollars, and the by-laws of the Board of Regents prescribe that no person shall be recommended for a degree until he has paid all dues, including the fee for diploma.

**Other Expenses.**—Students obtain board and lodging in private families for from three to five dollars a week. Clubs are also formed in which the cost of board is from one dollar and a half to two dollars and a half a week. Room rent varies from one dollar to three dollars a week for each student. The annual expenses of students, including clothing and incidentals, are, on the average, about three hundred and seventy dollars. Students on arriving in Ann Arbor can obtain information in regard to rooms and board by calling at the Steward's office.

There are no dormitories, no commons, and no stipends available for students in the Graduate School (with the exception of the Elisha Jones classical fellowship).

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## COURSES OF INSTRUCTION.

The following list of advanced courses does not attempt in all cases to discriminate graduate from undergraduate instruction; the reason being that the possession of a bachelor's degree may mean much or little as regards a student's proficiency in a particular subject. With a few exceptions, the courses here mentioned all presuppose a somewhat extensive preliminary study of the subject, a study covering from one to six or more years, according to the circumstances. In some instances the attempt is made to indicate, in terms of both time and work, the amount of preparation required for entrance upon the courses described. Many of the courses have advanced electives which are open to undergraduates, but have been shown by experience to be suited to the needs of many graduates. Different departments of instruction have adopted different modes of announcing their work. For further information reference may be made directly to the head of the department concerned.

### GREEK.

The courses here announced presuppose, in general, four years' previous study of Greek, viz., the usual preparatory course of two years, and two years of collegiate study devoted to the history of Greek literature and to reading from Lysias, Xenophon, Homer, Demosthenes, the Tragic Poets, and Aristophanes.

Professor D'OUGE:

#### Teachers' Seminary.

This course is intended to give students who expect to teach Greek training in teaching the elements of inflection and syntax. Lectures are given on the chief results of the modern comparative treatment of Greek sounds and inflections.—*Two hours a week, first semester.*

#### Seminary in Tragedy.

Interpretation of the Ajax, Philoctetes, and Oedipus at Colonus of Sophocles, with special reference to the principles of Greek dramatic art.—*Three hours a week, first semester.*

The History of Greek Art from the beginnings to the Roman Period.

Gardner's Handbook of Greek Sculpture and Collignon's Manual

of Greek Archæology will be made the basis of a more general study.  
—*Three hours a week, first semester.*

### Graduate Seminary: Introduction to Homer.

A study of the peculiarities of the Epic dialect and of the Homeric verse.—*Three hours a week, second semester.*

### Aristotle's Ethics, Books I, VI, X.

This course is intended especially for students of Greek philosophy.—*Two hours a week, second semester.*

### Professor PATTENGILL:—

#### Isæus and Demosthenes.

Legal orations, with special reference to Attic law and judicial procedure.—*Three hours a week, first semester.*

#### Seminary in Euripides.

*Two hours a week, second semester.*

#### The Greek Minor Poets.

*Two hours a week, second semester.*

### Dr. WAIT:—

#### Teachers' Course.

Greek writing.—*Two hours a week, second semester.*

### LATIN.

The courses here announced presuppose, in general, seven or eight years' previous study of Latin, viz., the usual preparatory course of four years, and three or four years of collegiate study devoted to Livy, Cicero, Horace, Terence, Latin writing, and the systematic study of Roman literature.

### Professor KELSEY:—

#### Latin Seminary.

Critical study of Catullus. Open to graduate students only.—*Two hours a week, throughout the year.*

#### Teachers' Course.

Interpretation of selected portions of Caesar and Virgil, with investigation of syntactical subjects.—*Three hours a week, throughout the year.*

## Catullus, Tibullus, Propertius. Interpretations and Lectures.

*Three hours a week, first semester.*

### [Introduction to Classical Philology. Lectures.

A brief outline of the history and present condition of classical studies is presented, followed by an extended discussion of the methods employed in classical philology. Attention is also paid to the bibliography of the subject.—*Three hours a week, first semester.* This course is omitted in 1897-98.]

### Introduction to Roman Archæology.

Lectures on the architecture and topography of Ancient Rome, and on sculpture and painting in the Roman period. This course will be illustrated by photographs, engravings, and the occasional use of stereopticon slides.—*Four hours a week, second semester.*

### [Latin Inscriptions.

Reading of inscriptions of different periods from squeezes and facsimiles. Interpretation of inscriptions with special reference to the study of life and society under the Early Empire.—*Three hours a week, second semester.* This course is omitted in 1897-98.]

## Professor ROLFE:—

### Latin Grammar.

Lectures on the phonology and morphology of the Latin language, with an outline of the syntax scientifically considered.—*Four hours a week, first semester.*

### The Italic Dialects.

Lectures on the phonology and morphology of the dialects, with the interpretation of selected inscriptions.—*Three hours a week, second semester.*

### The Letters of Cicero.

Interpretation of selected letters, with study of the Latin epistolary style.—*Three hours a week, first semester.*

### [The Letters of Pliny the Younger.

Interpretation of selected letters, with study of Roman life and society at the end of the first century, A. D.—*Three hours a week, second semester.* This course is omitted in 1897-98.]

## Latin Writing.

Attention is given not only to correctness of expression but also to matters of style and the finer distinctions of the language.—*Two hours a week, first semester; three hours a week, second semester.*

Assistant Professor DRAKE:—

## Roman Political Institutions.

Lectures.—*Two hours a week, first semester.*

## Historical Proseminary.

Study of historical subjects from the sources. The age of the Antonines.—*Two hours a week, second semester.*

## [Selections from the Annals of Tacitus.

Interpretation and lectures.—*Three hours a week, first semester.*  
This course is omitted in 1897-98.]

## Suetonius and Velleius Paterculus.

Lectures and interpretations.—*Three hours a week, first semester.*

## The Tusculan Disputations of Cicero.

Rapid reading, with an examination of Cicero's philosophical views.—*Three hours a week, second semester.*

Mr. MEADER:—

## The Institutes of Gaius and Justinian.

Interpretation of the text, with special study of the technical terms of the Roman Law. *Three hours a week, second semester.*

## SEMITICS.

The courses in Semitics are intended for:—(1) students who are seeking a liberal culture; (2) students of "classical" and modern languages, to furnish them with *necessary* data for the study of the philosophy of language and phonetic laws; (3) students who wish to make a special study of Semitics (the courses leading to the degree of Doctor of Philosophy); (4) students of ancient history; (5) students of art and archæology; (6) students of ethics and theology.

Professor CRAIG:—

## Hebrew.\*

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\* After 1896-97, candidates for a higher degree who wish to elect a Semitic language as one of the subjects leading to the degree, must have previously completed Courses 1 and 2 in Hebrew or an equivalent thereto in some Semitic language.

1. Genesis. Baer and Delitzsch's Text. Harper's Elements of Grammar. Craig's Hebrew Word Manual.—*Three hours a week, first semester.*

2. Deuteronomy, Joshua, I Samuel, Ruth, Jonah. Theile's Biblia Hebraica. Davies's Lexicon.—*Three hours a week, second semester.*

3. Prophetic Literature: Amos and Isaiah. Study of the nature and content of prophecy in its literary, historical, and ethical aspects. Text-books: Hebrew Bible, Driver's Hebrew Moods and Tenses.—*Two hours a week, first semester.*

4. The Book of Job, including study of the literary structure and critique of the dominant ideas. Baer and Delitzsch's Text and Haupt's Polychrome Edition (text by Siegfried).—*Two hours a week, second semester.*

### Assyrian.

1. Introduction to Easy Historical Inscriptions from the Ninth Century, B. C., with study of the grammar. Text-book: Delitzsch's Assyrische Lesestücke, dritte Auflage.—*Three hours a week, first semester.*

2. Historical Inscriptions. Selections from the Cuneiform Inscriptions of Western Asia (R. I-V).—*Second semester.*

3. The Babylonian Stories of Creation, the Deluge, and the War of Marduk against Tiamat, with lectures on the Cosmology of the Babylonians. Inscription of Tiglathpileser I, circa 1120 B.C.—*Two hours a week, first semester.*

4. Religious Literature. King's "The Prayers of the Lifting-up of the Hand." Craig's "Religious Texts."—*Second semester.*

5. Seminary in Sumerian.—*Two hours a week, first semester.*

### History and Archæology.

Lectures on the Ancient Babylonians, Assyrians, Hebrews, Phoenicians. The lectures are based on the study of the monuments.

### Arabic.

1. Introductory Course. Grammar and reading. Socin's Arabic Grammar (English edition) and Brünnow's Chrestomathy.—*Two hours a week, first semester.*

2. Selected Suras from the Quran, Chrestomathia Qurani Arabica, Nallino, with introductory lectures on the life of Muhammed and Muhammedanism.—*Two hours a week, first semester.*

### HELLENISTIC GREEK.

Professor CRAIG:—

#### New Testament.

Gospel of John, including grammatical study of the peculiarities of Hellenistic Greek, and historical introduction to the book. Text-



Books: Westcott and Hort's Greek New Testament, revised edition with introduction by Ph. Schaff; Thayer's Winer's New Testament Grammar; Thayer's Greek-English Lexicon.—*Two hours a week, first semester.*

### Septuagint.

Introductory lectures with selected readings from the historical and prophetic books. Apocrypha; Maccabees, Books I and II. Text-books: *Vetus Testamentum Græce* by L. Van Ess, or *The Old Testament in Greek* by H. B. Swete, Vols. I-III. Grammar and lexicon as in the first semester, and Liddell and Scott's Lexicon. *Two hours a week, second semester.*

### FRENCH.

Students will not be considered as taking graduate work in French, whether graduates of this University or of any other institution, who have not had the equivalent of at least Courses 1, 2, 3, 6, 7, 8, 20, and 21, as given in the undergraduate department of the University and described in the University Calendar for 1896-97, pages 60 to 62. These courses include grammar and composition, the reading of classic and modern prose, and the classic and modern drama.

Graduate work is either chiefly literary or chiefly linguistic, but it is expected that for the doctor's degree at least, and it is advised that for the master's degree as well, some work shall be done in both directions.

For students who choose to direct their work chiefly to the literature, opportunity will be given in the *first semester* of 1897-98 to study the Eighteenth Century dramatists, the Sixteenth Century literature, and some of the leading French philosophical writers; in the *second semester* the Seventeenth Century literature, the pre-revolutionary literature, Voltaire, Montesquieu, Rousseau, etc., the romantic movement at the beginning of the present century, and the satirical spirit in French literature. Private work will be assigned when it is thought desirable by the Professor in charge.

The oldest French literature will be studied in connection with the study of Old French, which will be continued *throughout the year*.

A teachers' course in French will be open to candidates for a master's degree who intend to teach that language.

The courses in French will be given by, or under the direction of, Professor WALTER.

### ITALIAN.

Students will not be considered as taking graduate work in Italian, who have not had the equivalent of Courses 1 and 2 as described in the University Calendar for 1896-97, page 62. In 1897-98, courses in Dante's *Divina Commedia* and *Vita Nuova* will be offered.

The courses in Italian will be given by, or under the direction of, Professor WALTER.

### SPANISH.

Students will not be considered as taking graduate work in Spanish, who have not had the equivalent of Courses 1 and 2 as described in the University Calendar for 1896-97, page 62. In 1897-98, dramas of Lope and Calderon will be offered.

The courses in Spanish will be given by, or under the direction of, Professor WALTER.

### GERMAN.

The advanced and graduate courses in German, announced below, presuppose a reasonably thorough and extended knowledge of the written and spoken language and an acquaintance with some of the masterpieces of modern German literature, both of which may be obtained from the undergraduate work not here mentioned. The minimum requirement of undergraduate preparation for the graduate courses consists in Courses 1, 2, 3, 4, 5<sub>a</sub>, 6<sub>a</sub> and options in 5<sub>a-c</sub> and 6<sub>a-c</sub> as described in the University Calendar for 1896-97, pages 63 and 64, or work equivalent to the courses mentioned.

Courses 5<sub>a</sub>, 5<sub>b</sub>, 5<sub>c</sub>, 6<sub>a</sub>, 6<sub>b</sub>, and 6<sub>c</sub> are primarily intended for undergraduates, but are recommended for graduates who wish to study the chief dramas of the classical period. Especially are Courses 5<sub>a</sub> and 6<sub>a</sub> (Faust, Parts I and II) suited for graduates.

Professor HENCH:—

#### Middle High German.

Lectures and recitations with assigned readings. This course is intended to serve as an introduction to Middle High German; incidentally it includes a brief sketch of the historical development of Modern German phonology and inflection. Paul, *Mittelhochdeutsche Grammatik*, 4 Aufl., and Bachmann, *Mittelhochdeutsches Lesebuch*. Advanced course open to undergraduates and graduates.—*Three hours a week, first semester.*

#### Modern German Sounds.

With a series of introductory lectures on the Rise of the Modern German Schriftsprache and on the elements of Phonetics. Text-book, Hempl, *German Orthography and Phonology*. Advanced course open to undergraduates and graduates.—*Two hours a week, first semester.*

#### German Syntax.

Lectures based upon Wunderlich, *Der deutsche Satzbau*, and Erd-

mann, *Grundzüge der deutschen Syntax*, with reports upon assigned topics. Advanced course open to undergraduates and graduates.—*Three hours a week, second semester.*

### History of German Literature.

Lectures, and readings from Max Müller's *German Classics*. A survey of German literature in its development from the beginnings down to the death of Goethe, with special regard to important epochs, notable literary monuments and underlying intellectual movements. Advanced course open to undergraduates and graduates.

I. From the earliest time to the end of the Middle Ages.—*Three hours a week, first semester.*

### Proseminary in Old High German.

The syntax of Isidor and the *Musee Fragments*. Primarily for graduates.—*Two hours a week, first semester.*

Assistant Professor WINKLER:—

### History of German Literature.

II. Modern Period.—*Three hours a week, second semester.*

### German Romanticism.

Lectures and assigned readings. The beginnings of German Romanticism. Influence of Kant, Fichte, and Schelling upon the Romantic movement. Its relation to German Classicism and to the social and political life of the times. The younger Romantic movement. The period of the wars of liberation. The intellectual movement leading to the revolution of 1848. Advanced course open to undergraduates and graduates.—*Two hours a week, throughout the year.*

### Proseminary in Modern German Literature.

The Storm and Stress Movement. Primarily for graduates.—*Two hours a week, second semester.*

Dr. MENSEL:—

### Nibelungenlied and Gudrun.

Reading, with lectures on language, mythological elements, and composition of the popular epic. Text-books: Zarncke's *Nibelungenlied*, 6 Aufl., and Symons's *Gudrun*. Advanced course open to undergraduates and graduates.—*Two hours a week, second semester.*

Dr. FLORER:—

**The Literature of the Sixteenth Century.**

Lectures, and reading of selections from Braune's *Neudrucke deutscher Litteraturwerke* des XVI und XVII Jahrhunderts. Advanced course open to undergraduates and graduates.—*Two hours a week, throughout the year.*

**GOTHIC.**

Dr. MENSEL:—

**Introductory Course.**

Lectures on phonology and morphology, and reading of the Gospels. Text-books: Braune's *Gotische Grammatik*, 4 Aufl., or Balg's translation of Braune, 2 ed. Primarily for graduates.—*Two hours a week, first semester.*

Professor HENCH:—

**Proseminary in Gothic Syntax.**

Primarily for graduates.—*Two hours a week, second semester.*

**SCANDINAVIAN.**

Professor HENCH:—

**Old Norse.**

Introductory course. Lectures on phonology and morphology based on Holthausen's *Altisländisches Elementarbuch* and Noreen's *Altnordische Grammatik* I, 2 Aufl., and reading of *Gunnlaugssaga Ormstungu*, ed. Mogk, and *Volsungasaga*, ed. Ranisch. Primarily for graduates.—*Two hours a week, second semester.*

**ENGLISH AND RHETORIC.**

The advanced work of this department proceeds along three main lines:—English and American Literature; History and Philology of the English Language; and Rhetoric. Advanced courses in Oratory are also offered in connection with this department.

The following courses (open also to undergraduates who are prepared to take them) will ordinarily be found adapted to the needs of graduate students. In case of students who have specialized in English for their first degree, additional advanced courses for graduate study are provided after conference with the candidate. Some of the courses given in recent years are the following: The Development of the English Novel; The English Satirists of the Seventeenth and Eighteenth Centuries; The Romantic Revival in England at the close of the last century; The Pre-Shakespearian Drama in England; Shakespeare's Histories.

## Professor DEMMON:—

## English Literature Seminary.

Each student is expected, first, to present two papers during the semester, one an essay upon an assigned masterpiece, the other a critique of a fellow-student's essay; second, to participate each week in a general *ex tempore* discussion of the work under consideration; third, to read the entire list of works with which the course deals, together with such critical literature on each subject as there may be time for. The aim of the course is to lay a foundation for correctly estimating literary masterpieces of widely varying types. The list of masterpieces is as follows: More's Utopia; Bacon's Essays; Milton's Areopagitica; Carlyle's Sartor Resartus; George Eliot's Silas Marner; Spenser's Faery Queen, Book I; Shakespeare's Sonnets; Milton's Paradise Lost; Dryden's Absalom and Achitophel; Pope's Essay on Man; Wordsworth's Excursion; Browning's Soul's Tragedy; Tennyson's Maud; Swinburne's Atalanta in Calydon.—*First semester.*

## Shakespeare Seminary.

The method is similar to that in the preceding course. The plays selected are: A Midsummer Night's Dream; The Merchant of Venice; As You Like It; Twelfth Night; The Tempest; Richard III; the two parts of Henry IV; Henry V; Hamlet; Othello; King Lear; Macbeth; Coriolanus.—*Second semester.*

## American Literature Seminary.

Authors studied: Irving, Poe, Hawthorne, Bryant, Longfellow, Emerson, Thoreau, Bayard Taylor, Whittier, Holmes, Lowell, Howells and James. Representative works of the authors named are studied, and an attempt is made to discover the distinctively American element by a comparative study with British authors.—*Second semester.* When this subject is taken for an advanced degree, individual work is assigned for the first semester, upon which the candidate is expected to make weekly reports.

## Principles of Criticism.

Lectures. Candidates who take their major in English Literature are expected to take this course in connection with the seminary work in English Literature and Shakespeare.—*Throughout the year.*

## Studies in the text of Shakespeare.

The aim will be to illustrate the methods of textual study as applied to a play like Hamlet, and the difficulties to be overcome in

establishing a text. The McMillan Shakespeare Library affords a very full apparatus for these studies. — *Two hours a week, first semester.*

Professor HEMPL:—

### Old-English\* Syntax.

The investigation of specific problems, together with a brief general survey of the subject.—*First semester.*

### Old-English Phonology and Morphology.

A study of early West-Saxon prose, with special reference to sounds and inflection.—*Second semester.*

### Historical English Grammar.

A general survey of the subject, and the investigation of the origin and development of impugned Modern-English idioms.—*First semester.*

### Old-English Poetry.

A study of early English literature, with special reference to the political monuments.—*Second semester.*

### Spoken English.

A study of colloquial English as distinguished from the English of books and of formal speech, and the investigation of the more important facts as to the fortunes of English speech in this country.—*Second semester.*

Students prepared to do advanced work in Old English may take the courses in Old-English syntax and in Old-English phonology and morphology. At the same time with the syntax, the general subject of historical English Grammar may be taken up, to be followed by the study of the modern spoken language; but students who desire to make a study of early English Literature will take instead the work in Old-English poetry, to be accompanied, at their choice, by the undergraduate course in Transitional and Early Middle English. Students not yet prepared to do advanced work in Old English will omit or defer the course in Old-English syntax, and will begin the subject with the undergraduates, preparing themselves for the two Old-English courses offered in the second semester.

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\* The term "Old English" is used in this Announcement for the period of English often called "Anglo-Saxon."

Professor SCOTT:—

**Development of Rhetorical Theory.**

A historical and comparative study of the growth of rhetorical theory from Aristotle to the present time.—*Throughout the year.*

Professor TRUEBLOOD:—

**Study of Great Orators, ancient and modern.**

Lectures on methods of public address and sources of power. Study of representative selections. The method is similar to that in the English Literature Seminary.—*Throughout the year.*

**Oral Discussions.**

This course is designed to develop readiness of extemporization. It involves the application of the principles of formal logic and elocution in the discussion of leading topics of the day. Students are required to present briefs of the subjects discussed.—*Second semester.*

**HISTORY.**

The graduate work described below presupposes such information and training as is represented by undergraduate Courses 1, 2, and 3 as described in the University Calender for 1896-97, pages 70 and 71, supplemented by one or more advanced undergraduate courses. In indicating the courses named below as adapted to the needs of graduate students, it is not intended to exclude other advanced undergraduate courses, especially those in English constitutional history, in mediæval history, and in American colonial history, which, in certain cases, graduate students will be asked to take.

A large part of the work of the graduate student will consist of individual research and investigation carried on under the personal supervision of the professor in charge. To insure such supervision two seminaries have been organized exclusively for graduates. The work of these seminaries has been so arranged that the same student may remain a member of the seminary for two or more years. In the library building are seminary rooms in which graduate students may carry on their work. In these rooms is shelved the Hagerman collection of books on history and political science, including many works to which the student has frequent occasion to refer. As occasion requires, books in special lines are placed in the seminary rooms for the use of advanced students, and everything is done to make the library serve the purpose of research.

**Professor HUDSON:—****The History of Europe since 1789.**

In the *first semester* a course will be given upon the political and social transformation of Europe since 1789. This will be followed in the *second semester* by a *three-hour* course upon the present problems of European politics.

**Seminary in European History.**

During the *first semester* a study will be made of the social and political condition of Russia and its advance both in Europe and in Asia. The subject for the *second semester* will be Bismarck and his work. One of the objects in both of these courses is to train students in the use of original material.—*Three hours a week.*

**Political Institutions.**

In the *first semester* the course will deal with English institutions; in the *second semester* with the institutions of Germany, Switzerland, France, and other European states.—*Two, or three, hours a week.*

These courses will be supplemented by others dealing with municipal institutions and problems.—*One hour a week.*

**Professor McLAUGHLIN:—****The Political and Constitutional History of the United States, 1776–1861.**

The purpose of this course is the careful study of the origin of the Constitution, its interpretation in history, the development of our political system, and the growth and tendencies of political parties. The work is based upon lectures and the careful examination of prescribed texts. The student is expected also to read in the library and to form a wide acquaintance with the secondary, and with some of the primary, authorities. Weekly reports on the reading are required. Those who have not had a thorough course in colonial history will find it desirable to take undergraduate Course 13 (University Calendar for 1896–97, page 72) in connection with this course.—*Three times a week, throughout the year.*

**Seminary in American History.**

The aim of the seminary is to guide and direct the student in the use of primary authorities and to give instruction in methods of research. Special subjects of investigation are assigned to members



of the seminary, and regular reports are made. Students at work upon theses are expected to report difficulties and successes, and are guided in their work. During a portion of the year the more important constitutional questions of the rebellion and the period of reconstruction are discussed, and there is an examination of the leading documents of this period.—*Two hours a week, throughout the year.*

### Constitutional Law and Political Institutions of the United States.

In this course there is a consideration of the Constitution as it has been interpreted by the courts, and a study of our political system as it appears in action. Graduate students electing this work will be expected to read important texts, to examine leading cases, and to report on problems in politics and administration.—*Three times a week, for one semester.*

In addition to following the three courses just described, graduate students will meet periodically to make reports on current literature, to discuss new books, and to examine important political questions or decisions of the courts.

### PHILOSOPHY.

The advanced courses described below and marked with an asterisk presuppose instruction in logic, ethics, and general psychology; also a general introduction to philosophy and a somewhat extended study of the history of philosophy, ancient, mediæval, and modern. Candidates for a higher degree who have not had a preparation equivalent to this will be expected to take certain of the lower courses, either before entering upon, or in connection with, their graduate work. Advanced courses bearing upon the history of philosophy are also given in the departments of Greek, Latin, French, and German. The courses in mathematics are strongly recommended for students specializing in philosophy.

#### A. HISTORY OF PHILOSOPHY.

Professor WENLEY:—

##### \*The Philosophy of Kant.

Lectures, and study of the Critique of Pure Reason.—*Two hours a week, first semester.*

##### \*Special Study in Kant.

For the more detailed study of special points than the preceding course affords.—*One hour a week, first semester.*

**\*The Philosophy of Hegel.**

Lectures, and study of the Logic.—*Two hours a week, second semester.*

Assistant Professor LLOYD:—

**The History of Philosophy.**

A general outline of the subject from Thales to the present century. The course is designed to state the development of philosophical problems and concepts, and thus to give the student his bearings in philosophy. It is therefore highly advisable, if this course has not been taken before beginning graduate work, that it be taken at once upon beginning it.—*Three hours a week, throughout the year.*

**\*Special work in the History of Philosophy.**

The object of this course is to introduce the student to the methods of investigation and discussion in the subject. Some special points of the general course are taken up and given more detailed consideration.—*One hour a week, throughout the year.*

**\*The Philosophy of Spinoza.**

Elwes's translation. Lectures, and study of the Ethics. *Two hours a week, first semester.*

**\*Special Study in Spinoza.**

For the more detailed study of special points than the preceding course affords.—*One hour a week, first semester.*

Mr. REBEC:—

**History of Ancient Ethics.**

Lectures and assigned reading.—*Two hours a week, first semester.*

**\*Plato's Republic.**

Collateral reading and theses.—*Two hours a week, first semester.*

**B. ETHICS.**

Professor WENLEY:—

**The Development of Ethical Ideas.**

A historical review of the growth of morality from its early appearance among savage tribes through the great civilizations of the ancient world to Christianity; concluding with some account of Christian influences.—*Two hours a week, first semester.*

**Metaphysic of Ethics.**

Lectures and reading.—*Two hours a week, second semester.*

Assistant Professor LLOYD:—

**Systematic Ethics.**

Lectures and reading.—*Two hours a week, second semester.*

**\*Special Work in Ethics.**

*One hour a week, second semester.*

Mr. REBEC:—

**\*Aristotle's Ethics.**

Collateral reading and theses.—*Two hours a week, second semester.*

**C. PSYCHOLOGY.**

The Psychological Laboratory is well equipped for original investigation.

Mr.———, Instructor in Psychology:—

**Representative Modern Psychologists.**

Lectures and reading.—*Two hours a week, throughout the year.*

**Beginners' Course in Experimental Psychology.**

*Two hours a week, each semester.*

**\*Research Course in Experimental Psychology.**

*Six hours a week, throughout the year.*

**D. SPECIAL COURSES.**

Professor WENLEY:—

**\*Philosophy since Hegel.**

Lectures and reading.—*Two hours a week, first semester.*

**\*The Theory of Evolution.**

A study of the metaphysical implications of modern science. Lectures, reading, thesis.—*Two hours a week, second semester.*

Assistant Professor LLOYD:—

**Philosophy of Religion.**

*Two hours a week, first semester.*

### Political Philosophy.

A critical study of society, of sovereignty, rights, duty, and of the idea of the social organism.—*Two hours a week, second semester.*

Mr. REBEC:—

### Æsthetics.

A historical review of leading theories and their connection with philosophical systems. Bosanquet's *History of Æsthetics* will serve as a basis of study.—*Two hours a week, first semester.*

### \*The Relation of Rhetoric to Philosophy.

A study of the philosophical basis of discourse.—*Two hours a week, second semester.*

### E. GRADUATE SEMINARY.

The Library of George S. Morris, late Professor of Philosophy in the University, has been given to the Philosophical Department. It contains about 1100 volumes covering the entire field of philosophical inquiry. They have been removed to the Morris Seminary Room which is reserved for the exclusive use of graduates and special students in Philosophy.

Professors WENLEY and LLOYD, Mr. REBEC, and the Instructor in Psychology:—

### Graduate Seminary.

The assignment of subjects is as follows: Professor WENLEY, Metaphysics and Ethics; Assistant Professor LLOYD, History of Philosophy and Ethics; Mr. REBEC, Logic, Æsthetics, Rhetoric; the Instructor in Psychology, General and Experimental Psychology.

### THE SCIENCE AND THE ART OF TEACHING.

The objects sought in this department, as they are defined in the Calendar of the University for 1896-97, page 75, are partly practical and partly scientific. The one end is gained in preparing teachers professionally for teaching; the other, in promoting the study of teaching as a division of human knowledge. In the Graduate School more stress is laid upon the scientific phase of the subject than in undergraduate work.

Qualification for admission to graduate work may be dealt with under two heads.

1. General Education.—When teaching is studied as science, art, or history it becomes reflective; that is, it takes account of its own principles, methods, and development. Manifestly, a student cannot pursue

pedagogical studies with profit unless he has an education broad enough to furnish him with a basis upon which to build. More than this, the fundamental ideas of teaching as a study are furnished by other studies. Pedagogy is a mixed science, having its presuppositions in other sciences. While a student who has taken any one of the purely literary degrees given by the University should be able to carry on this subject with advantage, the best work calls for an elementary acquaintance, at least, with physiology, psychology, logic, ethics, and æsthetics, for these are the sciences in which the presuppositions of pedagogy are found.

2. Special Preparation.—In this respect the department differs somewhat from most others. It cannot, under existing conditions, require previous study of the science, art, or history of education, because teaching, in only rare instances, is a subject of undergraduate instruction. Some candidates for the Graduate School have had such training; others have not. It is desirable that all who intend to pursue the subject in the School should have given some attention to it. A practical acquaintance with teaching as a teacher, principal, or supervisor is helpful; and so is a general knowledge of education and teaching derived from observation and reading current literature or standard works. It is desirable also that graduate students shall not find it necessary to take the most elementary work given in the department.

In respect to courses a few words must suffice. The theoretical and historical courses, and the courses in school supervision and in the comparative study of school systems, are all suitable for graduate students. If the courses as ordinarily pursued are not found adequate, they are re-enforced by outside reading. No graduate courses, so-called, are offered. Students who have taken courses in normal schools, or even in colleges, bearing the same names as those laid down in the Announcement and Calendar need have no fear of finding work they have already done merely duplicated. These courses are more extensive and thorough. For example, Compayré's History of Pedagogy is prescribed as a text-book, but is prescribed mainly to mark out, in a general way, a field that is cultivated much more broadly and deeply than it is cultivated by the author of the book.

Professor HINSDALE:—

### Theoretical and Critical.

The principles underlying the arts of teaching and school management expounded. Lectures and reading.—*Four hours a week, second semester.*

### School Supervision.

Embracing general school management, the arts of grading and

arranging courses of study, classifying pupils, examinations and promotions, conduct of teachers' meetings and institutes, etc. Recitations and lectures.—*Three hours a week, first semester.*

### History of Education: ancient and mediæval.

Recitations and lectures. Text-book: Compayré's History of Pedagogy. The subjects treated in the lectures given in this course are oriental, Greek, and Roman education, and the rise and early development of Christian schools.—*Three hours a week, first semester.*

### History of Education: modern.

Recitations and lectures. Text-book: Compayré's History of Pedagogy. The topics dealt with in this course of lectures are the movements of modern educational thought and practice.—*Three hours a week, second semester.*

### The Comparative Study of Contemporary Educational Systems: domestic and foreign.

Besides a general survey of the institutional organization of education in the United States, similar surveys are made of several foreign countries, as Germany, Italy, France, and England. Lectures.—*Two hours a week, second semester.*

### History of Education in the United States.

Beginning with the Colonial period the course will deal with the subject in its general features. The emphasis will be laid on the common schools, and particularly on the great common school revival in the present century. Lectures and reading.—*One hour a week, second semester.*

## POLITICAL ECONOMY AND SOCIOLOGY.

The strictly undergraduate courses in political economy represent the work of at least one academic year. These courses cover "Elements of Political Economy" and "Problems in Political Economy." For description see the University Calendar for 1896-97, pages 76 and 77.

Of the courses enumerated below, these designated as "Intermediate Courses" are open to undergraduate as well as to graduate students, but special instruction will be afforded all graduate students in connection with these courses, this special instruction being devoted to a more careful analysis and a more extended discussion than is possible in the lectures. The courses designated as "Graduate Courses" are open only to graduate students, or to undergraduates making a specialty of political economy in their senior year.

## A. INTERMEDIATE COURSES.

Professor F. M. TAYLOR:—

**History of Political Economy.**

This course consists of assigned readings in political economy in connection with a study of Ingram's History of Political Economy. It is important that students who desire to specialize in economics should take this course.

**Principles of the Science of Finance.**

Under the science of finance will be included a discussion of principles of public expenditure, public revenue, budgetary legislation, financial administration, public industries, and public debts.—*Two hours a week, second semester.*

**Money and Banking.**

A mixed text-book and lecture course. The class will be examined in Jevons's Money and the Mechanism of Exchange, White's Money and Banking, and Dunbar's Theory and History of Banking, as well as upon lectures. Current and monetary problems will receive especial attention.—*Two hours a week, first semester.*

**Socialism, including Communism, Collectivism, Land Nationalism, State Socialism, etc.**

*Two hours a week, second semester.*

Dr. DIXON:—

**History of the Development of Industrial Society.**

This course embraces a history of English industrial society from the twelfth century to the present time, and is designed to show how modern industrial customs and rights came into existence. As classified in the curriculum of the University of Michigan, it is regarded as introductory to all courses in political economy, and is usually taken before a study of the "Elements." It is inserted here because all advanced students do special reading upon industrial history.—*Two hours a week, second semester.*

**Industrial History of the United States.**

This course includes an account of the general course of industrial development, brief sketches of the leading industries, and a history of crises, the tariff, labor movements, etc.—*Two hours a week, first semester.*

### Transportation Problem.

This course traces the history of transportation as an industry, shows the social, industrial, and political results of modern methods of transportation, presents an analysis of the railway problem, and discusses the various solutions proposed.—*Two hours a week, second semester.*

### Seminary in Political Economy.

*First semester.*

### Seminary in Transportation.

*Second semester.*

Dr. COOLEY:—

### Theory and Practice of Statistics.

The early part of this course consists of lectures. Later, practical exercises are introduced, and during the second semester the student is expected to undertake work having in some measure the character of independent research.—*One hour a week, first semester.*

### Special Studies in Statistics.

*Two hours a week, second semester.*

### Principles of Sociology.

Lectures. This course aims at a systematic and comprehensive study of the underlying principles of social science. These principles are verified and illustrated by an examination of existing society.—*Three hours a week, first semester.*

### Problems in Sociology.

This course embraces a study of the laws of population, the treatment of criminals, poor-relief, the assimilation of immigrants, the development of great cities, and other sociological questions of present importance.—*Three hours a week, second semester.*

### Advanced Studies in Sociology.

These courses will be devoted to special study of sociological principles and problems, and will consist of assigned readings and reports.—*Two hours a week, first and second semesters.*

## B. GRADUATE COURSES.

The strictly advanced instruction in economics and sociology is carried on partly by lectures, partly by assigned readings and reports, and



partly by formal seminars designed to give practice in research. So far as lectures are concerned, it is organized as a solid course of three hours a week for three consecutive years. The course is given jointly by Professor F. M. TAYLOR, Dr. DIXON, and Dr. COOLEY, each instructor in turn claiming the attention of students for six consecutive weeks each semester. The subjects of instruction in each case are as indicated below.

Since the chief aim of advanced instruction is to familiarize students with the process of critical analysis, the particular topics investigated during any semester are relatively unimportant. In view, however, of the fact that the most advanced degree conferred by the University calls for three years of study, it seems necessary that the special topics should be changed each year for a series of three years. As a result of this arrangement candidates for a bachelor's degree (who are adequately prepared) are provided with one year, candidates for a master's degree with two years, and candidates for a doctor's degree with three years of specialized instruction. It will be noticed from the analysis given below that the topics covered in this specialized course have been somewhat cursorily treated in the "intermediate" or general University courses.

**\*Professor ADAMS:—**

[Development and Significance of English Political Economy.

*Three hours a week, for six weeks, first semester. This course will be omitted in 1897-99.]*

[Comparative Study of Fiscal Institutions.

*Three hours a week, for six weeks, second semester. This course will be omitted in 1897-99.]*

[Development and Significance of the Historical School of Economics.

*Three hours a week, for six weeks, first semester. This course is omitted in 1897-98.]*

[Labor Organizations and Corporations as Factors in Industrial Organization.

*Three hours a week, for six weeks, second semester. This course is omitted in 1897-98.]*

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\* Professor Adams has leave of absence for the year 1897-98. In place of his courses, the two courses of Dr. Dixon are given.

[Development and Significance of the Austrian School of Economy.

*Three hours a week, for six weeks, first semester.* This course is omitted in 1897-98.]

[Relation of the State to Industrial Action.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1897-98.]

Professor F. M. TAYLOR:—

The Value of Money.

Theory and statistics.—*Three hours a week, for six weeks, first semester.* This course will be omitted in 1898-99.

Social Philosophy, with Especial Reference to Economic Problems.

*Three hours a week, for six weeks, second semester.* This course will be omitted in 1898-99.

[The Agricultural Problem.

Treated from the comparative point of view.—*Three hours a week, for six weeks, second semester.* This course will be omitted in 1897-99.]

[Paper Money.

Government *versus* bank notes. Methods of regulation.—*Ten lectures, first semester.* This course is omitted in 1897-98.]

[The Standard of Value.

Different schemes historically and critically examined.—*Ten lectures, first semester.* This course is omitted in 1897-98.]

[Credit as a Factor in Production.

The modern institutions of credit historically and theoretically considered.—*Three hours a week, for six weeks, second semester.* This course is omitted in 1897-98.]

Dr. DIXON:—

The Agricultural Problem.

Historically and comparatively considered.—*Three hours a week, for six weeks, first semester.*

## Railroad Control.

Limits and methods. Treated with special reference to control by commonwealths.—*Three hours a week, for six weeks, second semester.*

Dr. COOLEY:—

## Social Psychology.

*Three hours a week, for six weeks, first semester.* This course will be omitted in 1898–1900.

## Current Changes in the Social Organization of the United States.

*Three hours a week, for six weeks, second semester.* This course will be omitted in 1898–1900.

## [Aims and Methods in the Study of Society.

*Three hours a week, for six weeks, first semester.* This course is omitted in 1897–98, but may be expected in 1898–99.]

## [Competition.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1897–98, but may be expected in 1898–99.]

## [Historical Development of Sociological Thought.

*Three hours a week, for six weeks, first semester.* This course is omitted in 1897–98.]

## The Laws of Population.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1897–98.]

## INTERNATIONAL LAW.

The courses in international law presuppose a general acquaintance with modern European history. Owing to the absence of President Angell, these courses are omitted in 1897–98, but may be expected in 1898–99.

President ANGELL:—

## [Lectures on International Law.

*Two hours a week, first semester.]*

## [History of Treaties.

*Two hours a week, second semester.]*

**MUSIC.**

Courses are given in the University, but not here enumerated, that provide instruction in the science and practice of choral music, the science of harmony, and simple and double counterpoint. The courses named below are intended for graduate students.

Professor STANLEY:—

Canon and Fugue.

*Two hours a week, throughout the year.*

Musical Form.

*Two hours a week, throughout the year.*

Free Composition.

*Two hours a week, throughout the year.*

Instrumentation.

*Two hours a week, throughout the year.*

Original work in research will be required of candidates for a doctor's degree, who take music as one of their subjects.

**MATHEMATICS.**

The courses mentioned below presuppose the usual preparatory course in algebra and elementary geometry, plane, solid, and spherical, together with two years of collegiate study devoted to trigonometry, higher algebra, plane analytic geometry, and differential and integral calculus.

In addition to the courses announced below, advanced work in mathematical reading and research will be arranged, so far as possible, to suit the needs of individual students.

**A. FOR UNDERGRADUATES AND GRADUATES.**

Professor BEMAN:—

Solid Analytic Geometry.

Frost, with references to Salmon.—*Two hours a week, first semester.*

Differential Equations.

Johnson, with references to Forsyth, Boole, and Mansion.—*Three hours a week, first semester.*

Teachers' Seminary.

Critical study of certain text-books in algebra and geometry, together with the discussion of methods and aims in mathematical

teaching, sketches of the history of mathematics, lists of books for teachers, etc.—*Two hours a week, throughout the year.*

Professor ZIWET:—

### Advanced Mechanics (I).

This course forms a direct continuation of the course in elementary mechanics; it is mainly devoted to the dynamics of a rigid body.—*Three hours a week, second semester.*

Assistant Professor MARKLEY:—

### Projective Geometry.

*Three hours a week, throughout the year.*

Dr. GLOVER:—

### Higher Algebra.

The more important topics to be considered in this course are: symmetric functions of the roots; resultants; solution of a system of  $n$  linear equations; theorems concerning integral functions of one and two variables; correspondence; linear transformation; invariants and covariants; symbolic forms.

## B. PRIMARILY FOR GRADUATES.

Professor BEMAN:—

### Advanced Differential and Integral Calculus.

Jordan's Cours d'Analyse.—*Two hours a week, throughout the year.*

### Higher Plane Curves.

Salmon, with references to Clebsch.—*Two hours a week, second semester.*

### [Linear Differential Equations.

*Two hours a week, second semester.* This course is omitted in 1897-98.]

Professor ZIWET:—

### Advanced Mechanics (II).

This course forms an introduction to mathematical physics; it is devoted to the theory of the potential and some of its applications to hydrodynamics, electricity, etc.—*Two hours a week, first semester.*

### Partial Differential Equations.

This course, which presupposes an elementary knowledge of ordinary differential equations and projective geometry, will be devoted mainly to partial differential equations of the first order and their application to geometry and mathematical physics.—*Two hours a week, throughout the year.*

Assistant Professor MARKLEY:—

### Theory of Functions.

*Three hours a week, throughout the year.*

### [Theory of Numbers.

*Two hours a week, throughout the year.* This course is omitted in 1897-98.]

Dr. GLOVER:—

### Theory of Substitutions.

The first half of this course will be devoted to the development of the elementary notions of groups, and, in particular, to the properties of substitution groups. The second half will take up the application of the latter to the algebraic equation.—*Two hours a week, throughout the year.*

### [Theory of Invariants.

An introduction to the symbolic theory of invariants as developed by Aronhold, Clebsch, and Gordan.—*Two hours a week, throughout the year.* This course is omitted in 1897-98.]

## PHYSICS.

The courses here announced presuppose about one and a half years' collegiate work in physics; viz., a course in mechanics, sound, light, electricity, magnetism, and heat, five hours a week, for one year; a beginners' course in laboratory work, two or three hours a week for half a year; and a course in primary and secondary batteries, two hours a week for half a year.

The courses in Mathematical Electricity, the Theory of Light, and the Theory of Heat, and the Advanced Laboratory Courses in Sound and Light, are primarily for graduates; the other courses are open to undergraduates, but they are found to be beyond the work done in many colleges.

Graduate students, who are properly qualified by their previous train-

ing, have opportunity for original research in the physical laboratory under the immediate supervision of the director and his associates.

**Professor CARHART:—**

**Dynamo Electric Machinery.**

*Three hours a week, second semester.*

**Alternate Current Apparatus.**

*Two hours a week, first semester.*

**Alternate Current Phenomena: Steinmetz.**

*Two hours a week, second semester.*

**The Theory of Heat: Preston.**

*Two hours a week, first semester.*

**Professor CARHART, Assistant Professor PATTERSON, and Dr. GUTHE:—**

**Electrical Measurements.**

Lectures, *one hour a week, throughout the year*; laboratory work, *three times a week, first semester; twice a week, second semester.*

**Assistant Professor PATTERSON:—**

**Mathematical Electricity.**

*Three hours a week, first semester; two hours a week, second semester.*

**Advanced Work in Magnetism.**

*Two hours a week, second semester.*

**Dr. GUTHE:—**

**Chemical Physics and Electro-Chemistry.**

Theories of solution and electrolytes, including the osmotic theory of the voltaic cell. Lectures and laboratory work.—*Three times a week, second semester.*

**Assistant Professor REED:—**

**The Theory of Light: Preston.**

Lectures and recitations, *two hours a week*; laboratory work, *twice a week, second semester.*

**Advanced Laboratory Work in Sound.**

*Twice a week, first semester.*

**Advanced Laboratory Work in Light.**

*Twice a week, second semester.*

**GENERAL CHEMISTRY.**

To be received as a candidate for a higher degree with chemistry as a major subject, the preparation must include the branches of general, analytical, and organic chemistry. The extent of work in these branches must have been equivalent in substance to the following named undergraduate courses in this University (University Calendar for 1896-97, pages 82 to 86): Course 2 or 5 in general chemistry, and Courses 1 or 3a, 4, and 10 in analytical and organic chemistry,—making in all about twenty-seven hours of undergraduate credit.\* If chemistry be taken as a minor subject in work registered for a higher degree, preparation must have been made in general chemistry, equivalent at least to undergraduate Courses 1 and 2 or 5 in this University.

Candidates for a doctor's degree, in addition to the requirements above specified, must have satisfied the committee in charge of their studies as to their fitness to enter upon the higher work. A reading knowledge of German and French is necessary.

Graduate students who are not in work for a degree, and those who are preparing for registration as candidates for higher degrees according to the requirements above stated, will be directed in such chemical studies as they require.

A very complete chemical library, with the full sets of the journals in demand for research, and with current literature in all branches of chemistry, is provided in the University General Library. A reading-room in the Chemical Laboratory furnishes duplicates of the full sets most used, as well as duplicates of the chief compilations.

**Professor FREER:—**

**Historical and Theoretical Chemistry.**

Lectures and historical readings.—*Two hours a week, first semester.*

**Chemical Literature; Journal Club.**

The Journal Club discusses current chemical literature. It is under the direction of Professor FREER, but all the instructors and assistants in the department of general chemistry take part therein.—*One hour a week, throughout the year.*

**Laboratory Research.**

The work may be in either organic or inorganic chemistry.—*Hours arranged with instructor, throughout the year.*

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\* An "hour of credit" implies the satisfactory completion of work equivalent to one exercise a week during one semester.



Mr. HIGLEY:—

Laboratory work in Inorganic Preparations.

*Hours arranged with instructor.*

The Determination of Molecular Weights.

*Two afternoons a week, first semester.*

Laboratory Research in Inorganic Chemistry.

*Hours arranged with instructor.*

Mr. LICHTY:—

Laboratory Work in Inorganic Preparations.

*Hours arranged with instructor.*

Laboratory work with the Polariscopes and the Spectroscopes.

*Hours arranged with instructor. second semester.*

Laboratory Research.

Inorganic and Physical Chemistry.—*Hours arranged with instructor.*

Dr. SHERMAN:—

Laboratory work in Inorganic Preparations.

*Hours arranged with instructor.*

Laboratory Research.

Organic or Inorganic Chemistry.—*Hours arranged with instructor.*

Dr. LACHMAN:—

Physical Chemistry.

Lectures.—*Two hours a week, first semester.*

Laboratory work in Physical Chemistry.

*Two mornings a week, second semester.*

Laboratory Research.

Organic and Physical Chemistry.—*Hours arranged with instructor.*

**ORGANIC CHEMISTRY AND ANALYTICAL CHEMISTRY.**

As to requirements for graduate studies, facilities, etc., see under General Chemistry, page 40.

Professor PRESCOTT, Dr. GOMBERG, and Mr. TROWBRIDGE:—

**Organic Synthesis and Ultimate Analysis.**

Open to those who are prepared in general chemistry, qualitative and quantitative analysis, the lecture course in organic chemistry, and the initial organic preparations. Laboratory work with reading by subjects in the library.—*Hours arranged with the several instructors, throughout the year.*

**Chosen Subjects in Organic Chemistry.**

Open to those who have had a primary lecture course and a course of laboratory work in organic chemistry.—*Lectures* (by Professor PRESCOTT), *twice a week, first semester.*

**The Benzene Derivatives.**

Open to those who have had a primary lecture course and a course of laboratory work in organic chemistry.—*Lectures* (by Dr. GOMBERG), *four times a week, second semester.*

**Analytical Organic Chemistry.**

Open to those who have had undergraduate Course 14, or its equivalent. Qualitative and quantitative work with alkaloids, fats, vegetable tissues, foods, poisons, or other organic matters.—*Hours arranged with the several instructors, throughout the year.*

**Investigation in Organic Chemistry.**

Open to those found to be prepared. Laboratory and library work, as assigned upon consultation.—*Hours arranged with the several instructors, throughout the year.*

Professor JOHNSON:—

**Qualitative Analytical Chemistry.**

The applicant must be able to pass examination in Courses 1 and 4 of the undergraduate studies or their equivalent. A study of qualitative methods and inorganic reactions.—*Lectures, two hours a week; laboratory work at hours arranged with instructor, second semester.*

### Investigation in Inorganic Reactions.

Open to those who have completed the last named course, or, being prepared for that course, have also a preparation for the desired research. Laboratory work and search of the authorities in the library.—*Hours arranged with instructor, throughout the year.*

Professor CAMPBELL:—

### Quantitative Analytical Chemistry.

Open to those who have had Course 4 of undergraduate studies, or its equivalent, and the chemical work required to precede it. Laboratory work in advanced quantitative analysis, with specialization in some direction suitable for the student.—*Hours arranged with instructor, throughout the year.*

### Investigations in Inorganic Structure and in Metallurgical Chemistry.

Open to those who have taken the work last named, or have had equal training, applicable to the research undertaken. Work with gases may be included, also micro-metallography.—*Hours arranged with instructor, throughout the year.*

## HYGIENE AND PHYSIOLOGICAL CHEMISTRY.

The courses here announced presuppose that the student taking them is prepared for original research.

Professor VAUGHAN:—

### Original Research on the Causation of Disease.

*Hours arranged with instructor, either first or second semester.*

Professor NOVY:—

### Advanced Physiological Chemistry.

Laboratory work and reading.—*Hours arranged with instructor, either first or second semester.*

## ASTRONOMY.

The courses here announced presuppose acquaintance with general astronomy and calculus.

Professor HALL:—

### Theoretical Astronomy.

Computation of orbits, correction of approximate elements, and theory of special perturbations.—*Five hours a week, throughout the year.*

**Mathematical Theory of Planetary Motion.**

Elementary treatment of general perturbations.—*Three hours a week, second semester.*

Professor HALL and Mr. TOWNLEY:—

**Extended Practical Course in the Use of Instruments.**

*Hours (at the observatory) arranged with instructors.*

Mr. TOWNLEY:—

**Method of Least Squares.**

*Two hours a week, second semester.*

**MINERALOGY.**

The higher work in mineralogy presupposes an elementary knowledge of chemistry and an introductory course in mineralogy, combining theoretical instruction with practice in determining minerals. The work will be directed by Professor PETTEE.

**GEOLOGY.**

The course of instruction in geology for undergraduates, as announced in the University Calendar for 1896–97, pages 90 and 91, embraces from two to three years of University work. The first year is devoted to elementary studies in physical geology, historical geology, and physical geography, giving three hours a week to each for one semester. Le Conte's Elements of Geology and Dana's Manual of Geology are used, supplemented by lectures and exhibitions of specimens, maps, etc. During the second year more detailed instruction is given, two hours each week, in the same general subjects. Green's Physical Geology is used for reference during the first semester, supplemented by lectures and laboratory work. Each student is given a special subject for investigation in connection with which a thesis of about 2500 words is required. During the second semester palæontological studies are carried on with the aid of various treatises and laboratory work. A special subject is assigned each student and a short thesis is required.

Students in the graduate school may enter either of the advanced courses mentioned above, providing studies equivalent to the elementary courses have been pursued. Those who have done more work than is represented by the elementary course may make special arrangements for instruction and assistance in various lines of study, dependent on their tastes and acquirements. In a general course the current literature of geology will be read with special reference to Pleistocene geology, and to the origin and classification of topographic forms, glacial records, lake

histories, erosion, and all of the processes by which the surface of the earth has come to have its present form.

The geological museum is being rearranged and a series of fossils selected to illustrate the life history of North America. This collection is intended especially for the use of students in the elementary courses, but may be consulted by advanced students as well. The specimens will be exhibited in the lecture room as required, and after lectures will be returned to the cases in the museum where they will be available for examination at any time.

There is a second collection embracing some ten thousand specimens of both American and European fossils, which is arranged zoologically and intended for the use of advanced students in palæontology. Special collections of rocks, brachiopods, corals, etc., numbering from one hundred and fifty to two hundred specimens each are arranged in the geological laboratory for the immediate use of students.

The collection in physical geology is small, but efforts are being made for its enlargement, and ample material will be on hand to illustrate lectures in this department. Students bringing private collections will be given an opportunity to arrange them in cases provided for the purpose, and facilities for consulting original monographs, and making comparison with specimens in the museum.

The geological laboratory is provided with apparatus for preparing thin sections of fossils and rocks, and with microscopes and photographic instruments. The laboratory is open to students from nine until five each day throughout the collegiate year.

The work in geology will be conducted by, or under the direction of, Professor RUSSELL.

### ZOOLOGY.

The courses here announced presuppose a year's work in general biology, such as is carried on in this University conjointly by the departments of botany and zoology. Following the general biology, work is provided in both invertebrate and vertebrate zoology. Candidates for the higher degrees will usually pursue both lines of work, but will find it of advantage to specialize in one of them; they will also be required to have a knowledge of the elements of physics and chemistry and some acquaintance with French and German.

In the laboratory, a description of which is given in the University Calendar for 1896-97, page 30, the student learns methods of dissection, staining, imbedding, section-cutting, graphic and solid reconstruction, and other technical methods of investigation. A library, shelved in the laboratory, contains sets of the important English and Foreign periodicals, as well as many monographs, and other separate publications. It contains also an extensive collection of original papers relating to the inver-

tebrate fauna of fresh waters. The private collections of the instructors and the library of the Department of Medicine and Surgery, which is rich in the literature of vertebrates, are also accessible to students. The original papers in connection with both lectures and laboratory work are placed in the hands of students, and special reading is required.

Graduate students will often find the elementary work in general biology of value to them, and they can rarely omit, without loss, any of the courses in zoology that are open to undergraduates.

A student who selects zoology as a *minor* for the *master's degree* may pursue the course in invertebrate morphology, vertebrate comparative anatomy, vertebrate embryology, or histology, but is not required to do work in more than one of these subjects. If zoology be chosen as a *major*, work may be taken in invertebrate morphology and at the same time in any two of the branches of vertebrate morphology named above. For any of these branches the student may substitute research work, and such substitution is advised for those who do not intend to become candidates for the doctor's degree.

The work outlined for those who elect zoology as a major for the master's degree is suitable for candidates for the *doctor's degree* who elect this subject as a *minor*.

Those electing zoology as a *major* for the *doctor's degree* are expected to complete all the courses offered. During the first part of his term of residence at the University, the candidate should devote his time to these courses and to the completion of work on the minors. In his second year of residence, in addition to completing the work mentioned, he is expected to repeat a designated piece of research work in order to acquaint himself with methods of investigation. At the same time he does assigned reading on the more important problems of zoology and on zoological history and theory. At the least one year must be devoted to the research which is to be embodied in the doctor's dissertation.

Those electing zoology as a major, will find it of advantage to select as one minor either botany, physiology, systematic zoology, palæontology, or physiological psychology. Less closely related is work in bacteriology, physiological and organic chemistry, and geology.

#### A. PRIMARILY FOR GRADUATES.

Professor REIGHARD:—

#### Current Literature of Zoology.

The instructors and advanced students hold weekly meetings at which reports are made on important current papers, followed by informal discussion. Although the meetings are open to all, the membership is restricted.—*One hour a week, throughout the year.*

Research work in zoology, invertebrate morphology, and vertebrate comparative anatomy, embryology, and histology.

Definite problems are assigned and worked out under the constant supervision of the instructor. The locality affords exceptional advantages for work on vertebrate embryology (Petromyzon, several Teleosts, Amia, Acipenser, Amblystoma, and other forms are under control) and for faunistic or experimental studies on invertebrates. Students intending to begin this work should confer with the professor in charge as early as the preceding spring in order that they may have time in which to prepare necessary material.—*Hours arranged with instructor, throughout the year.*

Assistant Professor HUBER:—

### Microscopic Anatomy of the Brain and Special Sense Organs.

This course presupposes a knowledge of mammalian (or human) anatomy, including dissection. It must be preceded or accompanied by a course in microscopic technique. Work in vertebrate embryology, though not indispensable, is advised.—*Five hours a week, first or second semester.*

### B. FOR GRADUATES AND UNDERGRADUATES.

Professor REIGHARD:—

### The Comparative Embryology and Anatomy of Vertebrates.

The work in embryology, which precedes the anatomy, begins with a study of the early stages of fishes and amphibia and concludes with detailed work on the chick and the rabbit. In anatomy a few type forms are dissected and preparations of other forms are studied. The lectures are illustrated by charts and preparations especially designed for the purposes of this course.—*Five hours a week, throughout the year.*

This work may be advantageously preceded by the undergraduate courses in mammalian anatomy and histology (Courses 4, 5, 6, and 7, University Calendar for 1896-97, pages 94, 95) though these courses are not required.

### Field Club.

Field excursions and laboratory work, with occasional lectures. The work will consist of the careful collection, identification, preser-

vation, and study of specimens of the local fauna. In the conduct of this course Assistant Professor WORCESTER and Dr. LILLIE will also have part.

### Mammalian Anatomy.

Dissection of the cat, with class-meetings twice a week for quizzes on the anatomy of the cat and for such lectures as may be necessary. It is the purpose of the course to afford a training in mammalian anatomy which shall be substantially equivalent to the training which the medical student receives in human anatomy. This training gives that mastery of anatomical facts and that knowledge of anatomical technique, which are believed to furnish the most satisfactory basis for the study of human or comparative anatomy. The class makes use of type-written copies of a descriptive anatomy of the cat prepared by Professor REIGHARD. The laboratory work will be conducted by an assistant.—*Five times a week, throughout the year.*

### Assistant Professor WORCESTER:—

#### Museum Work.

Students desiring to carry on systematic work on special groups represented in the University Museum, will be given every opportunity to do so, but must first satisfy the instructor in charge of their fitness to pursue the work.—*Either first or second semester.*

### Assistant Professor HUBER:—

#### Vertebrate Histology.

Lectures and laboratory work with instruction in methods.—*Five hours a week, first or second semester.*

#### Methods of Vertebrate Histology.

Laboratory work with reading.—*Two hours a week, second semester.*

### Dr. LILLIE:—

#### Invertebrate Morphology.

The lectures treat of the comparative anatomy and ontogeny of invertebrates. The laboratory work includes a series of forms which supplements that studied in the course in general biology. Students are required to prepare and deliver lectures on assigned topics.—*Five hours a week, first semester.*

#### Experimental Morphology.

The lectures review recent experimental work in embryology and show the bearing of the results on theories of heredity.—*One hour a week, second semester.*



By special arrangement this course may be extended to *three hours a week*, and will then include laboratory work. A laboratory has been fitted up especially for this work.

### BOTANY.

#### A. PRIMARILY FOR GRADUATES.

Professor SPALDING and Assistant Professor NEWCOMBE:—  
Investigations in Morphology and Physiology.

*Throughout the year.*

#### B. FOR GRADUATES AND UNDERGRADUATES.

The equivalent of a full year in the study of botany is required for admission to any of the courses named below, all of which consist largely of laboratory work.

Professor SPALDING:—

Morphology and Physiology of Fungi.

Lectures and laboratory work.—*Five hours a week, first semester.*

Plant Morphology.

Aside from the laboratory work, there will be lectures and reading directed toward the principles of relationship and classification.—  
*Three, or five, hours a week, second semester.*

Current Literature of Botany.

Important papers on botany are reviewed and discussed.—*One hour a week, throughout the year.*

Assistant Professor NEWCOMBE:—

Cell Morphology and Physiology.

The application of finer methods to biological research; cell structure, organization, and activity; mitosis; heredity; the cell theory. Lectures and laboratory work.—*Five hours a week, first semester.*

Experimental Physiology of Plants.

A laboratory study of the relations of plants to their environment, as manifested by the phenomena of nutrition, growth, and irritability. The work in the first semester will deal with special problems, and, in the second semester, with general physiology.—*Five hours a week, throughout the year.*

**PHYSIOLOGY.**

The advanced work in physiology presupposes a knowledge of mammalian anatomy, including histology, and the elements of physics and chemistry. The required training is to be got from such courses as 1 and 2 in general biology, 4, 5, 6, and 7 in zoology (or, in place of 4 and 5, courses in descriptive human anatomy and practical anatomy), 1, 2, and 3a in physics, 5 in general chemistry, and 28 in organic chemistry (described in the University Calendar for 1896-97, pages 80 to 95.) Ability to read German is indispensable, and French is desirable, for students taking physiology as a major study for an advanced degree, though in some cases a candidate may be considered qualified to begin his advanced work prior to the completion of these requirements.

Professor LOMBARD:—

Lectures and Recitations.

*Five hours a week, throughout the year.*

Laboratory Course.

*Three times a week, one-third of a semester.*

Physiological Experimentation.

*One hour a week, one semester.*

Physiological Research and Collateral Reading.

Arranged to meet the wants of students who take physiology as a major study.

# Catalogue of Students, 1896-97.\*

## RESIDENT GRADUATES.

| NAME.                                                                                                                           | RESIDENCE.            |
|---------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Charles Wallace Adams, A.B., 1894,<br>Political Economy; American History; Constitutional Law.                                  | <i>Ann Arbor.</i>     |
| Mary Joice Adams, Ph.B., 1896,<br>American History; English History; Latin.                                                     | <i>Normal, Ill.</i>   |
| Jennie Claire Anderson, Ph.B., <i>Oberlin College</i> ,<br>1894,<br>Latin; Roman Political Antiquities; Pedagogy.               | <i>Oberlin, O.</i>    |
| †Georgia Farrand Bacon, B.S., 1897,<br>Zoology; Botany; Physiology.                                                             | <i>Pontiac.</i>       |
| Annie Louise Bacorn, B.L., 1896,<br>Rhetoric; English Literature; Philosophy.                                                   | <i>Ann Arbor.</i>     |
| Mary Bartol, A.B., <i>Bucknell University</i> , 1894,<br>A.M., <i>ibid.</i> , 1895,<br>Greek; Italian; French.                  | <i>Lewisburg, Pa.</i> |
| James Pyper Bird, A.B., 1893,<br>Latin; German; Greek.                                                                          | <i>Ann Arbor.</i>     |
| Georgiana Cleis Blunt, Ph.B., 1896,<br>American Literature; French Literature; History of Philosophy.                           | <i>Ann Arbor.</i>     |
| Boyd Bode, A.B., <i>Penn College</i> , 1896,<br>German; Ethics; Modern Philosophy.                                              | <i>Leighton, Ia.</i>  |
| Ella Bourne, Ph.B., <i>DePauw University</i> , 1893,<br>Latin; German; Roman Political Antiquities.                             | <i>Ann Arbor.</i>     |
| Clifton Henry Briggs, B.S., <i>Mich. Agr. Coll.</i> , 1896, <i>Lacey</i> .<br>General Chemistry; Physics; Analytical Chemistry. |                       |
| Alice Brown, A.B., 1896,<br>American History; Constitutional Law; Political Economy.                                            | <i>Ann Arbor.</i>     |

\*The principal subjects of study pursued by candidates for an advanced degree are indicated under their respective names.

An asterisk (\*) before a student's name indicates that the student is also pursuing studies in the Department of Medicine and Surgery or in the Department of Law.

A dagger (†) indicates that the student was admitted to the Graduate School at the beginning of the second semester, on completion of the requirements for the bachelor's degree indicated in each case, though the degree was not to be conferred until the end of the year.

- †Edward Thomas Brown, Ph.B., 1897, *Wolcott, N. Y.*  
American History; European History; English Literature.
- Gertrude Buck, B.S., 1894, M.S., 1896, *Kalamazoo.*  
Rhetoric; English Literature; Psychology.
- Archibald Campbell, Ph.B., 1896, *Manhattan, Ill.*  
Organic Chemistry; Analytical Chemistry; Geology.
- Elizabeth Alma Campbell, Ph.B., 1891, *Ann Arbor.*  
Æsthetics; German; French.
- Spencer Peter Carmichael, Ph.B., *Lafayette Col-  
lege*, 1893, *LeRoy, N. Y.*  
Physics; Mathematics; Chemistry.
- Einma Jane Chesney, A.B., *Kalamazoo College*,  
1892, *Midland.*  
Latin; Roman Political Antiquities; English Literature.
- Eda May Clark, B.L., 1891, *Ann Arbor.*  
Analytical Chemistry; French; Physics.
- Bessie Maud Colby, B.L., 1896, *Adamsville.*  
Political Economy; European History; Spanish.
- Charles Henry Cole, A.B., 1882, *Ackley, Ia.*  
Pedagogy; History of Philosophy; English Literature.
- Samuel Richard Cook, B.S., 1895, *Ann Arbor.*  
General Chemistry; Physics; Astronomy.
- Thomas Benton Cooley, A.B., 1891, M.D., 1895, *Ann Arbor.*  
Physiological Chemistry; General Chemistry; Bacteriology.
- Carl Herbert Cooper, A.B., *Upper Iowa Univ.*,  
1895, *Quasqueton, Ia.*  
Political Economy; History; Sociology.
- \*Arnold Lyman Davis, A.B., *University of South  
Dakota*, 1895, *Watertown, S. Dakota.*  
Sociology; Political Economy; International Law.
- Edna Daisy Day, B.S., 1896, *Ann Arbor.*  
Botany; Hygiene; Embryology.
- William Bellows Decker, A.B., 1896, *Battle Creek.*  
Bacteriology; Physiology; Hygiene.
- Nina May Doty, Ph.B., 1896, *Ann Arbor.*  
German; English Literature; French.
- John Robert Effinger, Jr., Ph.B., 1891, Ph.M.,  
1894, *Ann Arbor.*  
French Literature; Italian Literature; History.
- Charles Edward Everett, B.L., 1889, *Lansing.*  
Botany; Vegetable Physiology; Organic Chemistry.
- Charles Albert Farnam, A.B., 1896, *Sand Lake.*  
Latin; Greek; Roman Political Antiquities.

- Oliver D. Frederick, B.S., *West Chester Normal School*, 1895, *North Wales, Pa.*  
Mathematics; Physics; Pedagogy.
- \*Conrad Georg, A.B., 1896, *Ann Arbor.*  
Physiological Chemistry; Histology; Physiology.
- Neil Alexander Gilchrist, A.B., 1896, *Ishpeming.*  
Hebrew; Philosophy; Ethics.
- Frederic Samuel Goodrich, A.B., *Wesleyan University*, 1890, *Albion.*  
Greek; Hellenistic Greek; Archæology.
- Charles Henry Gray, B.L., 1895, M.L., 1896, *Ann Arbor.*  
English Literature; Rhetoric; Pedagogy.
- Albert Emerson Greene, Ph.B., 1895, B.S., 1896, *Ann Arbor.*
- George Depue Hadzsits, A.B., 1895, A.M., 1896, *Detroit.*  
Greek; Latin; Greek Antiquities.
- \*Walter Charles Haight, B.L., 1896, *Sycamore, Ill.*  
American History; Political Economy; European History.
- Arthur Graham Hall, B.S., 1887, *Ann Arbor.*  
Physics; Mechanics; Heat.
- Samuel Allen Jeffers, A.B., *Central Wesleyan College*, 1892, *New Florence, Mo.*  
Latin; Greek; Pedagogy.
- John Black Johnston, Ph.B., 1893, *Ann Arbor.*  
Animal Morphology; Physiological Psychology; Physiology.
- Ellen Ann Kennan, A.B., 1896, *Ann Arbor.*  
Greek; Latin; Roman Political Antiquities.
- Frank Pattengill Knowlton, A.B., *Hamilton College*, 1896, *Holland Patent, N. Y.*  
Physiology; Experimental Morphology; Physiological Chemistry.
- Riotaro Kodama, *Doshisha College*, *Wakayama, Japan.*  
Political Economy; Finance; History.
- Fanny Elizabeth Langdon, B.S., 1896, *Plymouth, N. H.*  
Botany; Invertebrate Morphology; Experimental Embryology.
- William Adams Lewis, B.S., 1896, *Rockford, Ill.*  
American History; Pedagogy; English Literature.
- \*Anna Willard Locke, A.B., *Wellesley Coll.*, 1892, *Nashua, N. H.*  
Bacteriology; Physiological Chemistry; Histology.
- Almira Lovell, A.B., 1884, *Flint.*  
Latin; Greek; Classical Archæology.
- Verdie Jane Baker McKee, B.L., 1893, *Auburn, Ala.*  
American Literature; Rhetoric; Pedagogy.
- William Dexter McKenzie, A.B., 1896, *Holder of the Bennett Fellowship in Classics, Ann Arbor.*  
Latin; Greek; Roman Political Antiquities.

- Harriett Elvira McKinstry, Ph.B., 1896, *Cleveland, O.*  
 Latin; Classical Archæology; Roman Political Antiquities.
- Lois Azubah McMahon, Ph.B., 1896, *Ann Arbor.*  
 English Literature; English History; Political Economy.
- †Grace Grieve Millard, Ph.B., 1897, *Adrian.*  
 Latin; History; Roman Political Antiquities.
- Aura Maud Miller, B.L., 1890, *Ann Arbor.*  
 English Literature; English Language; Pedagogy.
- \*Craig Carlton Miller, A.B., *Williams Coll.*, 1895, *Marshall.*  
 English Literature; American Literature; American History.
- Paul Ingold Murrill, B.S., *Kentucky State Coll.*,  
 1895, M.S., *ibid.*, 1896, *Detroit.*
- Frank Wesley Nagler, B.S., 1892, *Ann Arbor.*  
 Physiology; Organic Chemistry; Analytical Chemistry.
- Walter Hammond Nichols, B.S., 1891, *Ann Arbor.*  
 Political Economy; Sociology; History.
- Cecile Nielsen, B.L., *Olivet College*, 1893, *Pentwater.*  
 Latin; German; Roman Political Antiquities.
- Marna Ruth Osband, A.B., 1895, *Ypsilanti.*
- Erastus Devillo Palmer, A.B., *Hillsdale Coll.*, 1889, *Clare.*  
 English Literature; European History; Pedagogy.
- Jessie Phelps, B.S., 1894, *Pontiac.*
- James Barkley Pollock, B.S., *University of Wisconsin*, 1893, M.S., *ibid.*, 1896, *Orangeville, Ill.*  
 Botany; Experimental Vegetable Physiology; Organic Chemistry.
- George Rebec, Ph.B., 1891, *Ann Arbor.*  
 Ancient Philosophy; Logic; Rhetoric.
- †Henry Ormal Severance, A.B., 1897, *Walled Lake.*  
 English Literature; Rhetoric; Pedagogy.
- Bessie Bingham Stevens, A.B., 1896, *Ann Arbor.*  
 Latin; Greek; Classical Archæology.
- Susan Lavinia Stoner, B.L., 1896, *Ann Arbor.*  
 European History; American History; History of Philosophy.
- Duane Reed Stuart, A.B., 1896, *Detroit.*
- James Wellings Sturgis, A.B., 1896, *Detroit.*  
 Latin; Roman Political Antiquities; Greek.
- Gertrude Sunderland, A.B., 1895, *Ann Arbor.*
- Louise Bradford Swift, A.B., *Wellesley Coll.*, 1890, *Detroit.*  
 Latin; Greek; Roman Political Antiquities.
- Ira Dudley Travis, Ph.B., *Albion College*, 1889,  
 Ph.M., 1894, *Ann Arbor.*  
 American History; Political Economy; European History.
- Lizzie Trebilcox, A.B., 1896, *Ypsilanti.*

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|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| John Walter Verdier, Ph.B., 1895,<br>Bacteriology; Hygiene; Physiology.                                                                 | <i>Grand Rapids.</i>  |
| Lillie Mae Volland, B.L., 1896,<br>American History; English Literature; Pedagogy.                                                      | <i>Ann Arbor.</i>     |
| Herbert Sebring Voorhees, A.B., 1896,<br>Latin; Pedagogy; American Literature.                                                          | <i>White Lake.</i>    |
| Ellis David Walker, B.S., 1893,<br>Pedagogy; Ethics; Sociology.                                                                         | <i>Ann Arbor.</i>     |
| Hugh Elmer Ward, B.S., <i>Mich. Agr. Coll.</i> , 1895,<br>Bacteriology; Physiology; Organic Chemistry.                                  | <i>Ada.</i>           |
| Arletta Leora Warren, Ph.B., <i>Univ. of Wooster</i> ,<br>1889,<br>Latin; Roman Political Antiquities; Greek.                           | <i>Wooster, O.</i>    |
| Mary Gilmore Williams, A.B., 1895, <i>Holder of<br/>the Elisha Jones Classical Fellowship</i> ,<br>Latin; Greek; Political Antiquities. | <i>Corning, N. Y.</i> |
| Katherine D. Wiltsie, Ph.B., 1896,<br>United States History; German; Pedagogy.                                                          | <i>Detroit.</i>       |
| Elbert Wood, A.B., <i>Olivet College</i> , 1888,<br>English Literature; Old English; Pedagogy.                                          | <i>Ann Arbor.</i>     |
| Herbert Blowers Woodward, Ph.B., <i>Hillsdale<br/>College</i> , 1891,                                                                   | <i>Hillsdale.</i>     |
| Clarence George Wrentmore, B.S., 1893,<br>Mathematics; Mechanics; Projective Geometry.                                                  | <i>Ann Arbor.</i>     |

### CANDIDATES FOR A MASTER'S DEGREE, STUDYING IN ABSENTIA.

| NAME.                                                                                                                | RESIDENCE.                  |
|----------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Louis Begemann, B.S., 1889,<br>Sound and Light; Pedagogy; Electricity.                                               | <i>Fairfield, Ia.</i>       |
| Allen Lysander Colton, Ph.B., 1889, A.B., 1890,<br>Astronomical Photography; Optics; Practical Astronomy.            | <i>Mount Hamilton, Cal.</i> |
| Bernard Benjamin Selling, Ph.B., 1894, LL.B.,<br>1895,<br>Constitutional Law; International Law; English Literature. | <i>Detroit.</i>             |
| Lillie Maria Shaw, A.B., 1884,<br>Greek; German; Botany.                                                             | <i>Saginaw, East Side.</i>  |
| Lura Wallace Tozer, Ph.B., 1885,<br>American Literature; German; French.                                             | <i>Detroit.</i>             |





UNIVERSITY OF MICHIGAN

DEPARTMENT OF LITERATURE, SCIENCE, AND THE ARTS

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GRADUATE SCHOOL

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ANNOUNCEMENT

FOR

1898-99

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ANN ARBOR, MICHIGAN  
PUBLISHED BY THE UNIVERSITY  
1898

## CALENDAR.

1898.

Sept. 22-24. *Examination for Admission to the Department of Literature, Science, and the Arts.*

Sept. 27. **FIRST SEMESTER BEGINS IN ALL DEPARTMENTS OF THE UNIVERSITY.**

Nov. Thanksgiving Recess of three days, beginning Tuesday evening, in all Departments of the University.

Dec. 22. (Evening.) Holiday Vacation begins in all Departments.

1899.

Jan. 10. Exercises Resumed.

Feb. 10. (Evening.) **FIRST SEMESTER CLOSES.**

Feb. 13. **SECOND SEMESTER BEGINS.**

April 14. (Evening.) Recess begins, ending April 24 (evening).

June 22. **COMMENCEMENT IN ALL DEPARTMENTS OF THE UNIVERSITY.**

## ADMINISTRATIVE COUNCIL.

JAMES B. ANGELL, LL.D., *President.*

ALBERT B. PRESCOTT, M.D., LL.D., *Director of the Chemical Laboratory, and Professor of Organic Chemistry.*

REV. MARTIN L. D'OOGHE, L.L.D., *Professor of the Greek Language and Literature.*

WILLIAM H. PETTEE, A.M., *Professor of Mineralogy, Economic Geology, and Mining Engineering.*

EDWARD L. WALTER, Ph.D., *Professor of Romance Languages and Literatures.*

ISAAC N. DEMMON, LL.D., *Professor of English and Rhetoric.*

ALBERT H. PATTENGILL, A.M., *Professor of Greek.*

WOOSTER W. BEMAN, A.M., *Professor of Mathematics.*

VICTOR C. VAUGHAN, Ph.D., Sc.D., M.D., *Professor of Hygiene and Physiological Chemistry, and Director of the Hygienic Laboratory.*

CHARLES S. DENISON, M.S., C.E., *Professor of Descriptive Geometry, Stereotomy, and Drawing.*

HENRY S. CARHART, LL.D., *Professor of Physics, and Director of the Physical Laboratory.*

VOLNEY M. SPALDING, Ph.D., *Professor of Botany.*

HENRY C. ADAMS, Ph.D., *Professor of Political Economy and Finance.*

BURKE A. HINSDALE, LL.D., *Professor of the Science and the Art of Teaching.*

RICHARD HUDSON, A.M., *Professor of History, and Dean of the Department of Literature, Science, and the Arts.*

ALBERT A. STANLEY, A.M., *Professor of Music.*

FRANCIS W. KELSEY, Ph.D., *Professor of the Latin Language and Literature.*

OTIS C. JOHNSON, Ph.C., A.M., *Professor of Applied Chemistry.*

PAUL C. FREER, Ph.D., M.D., *Professor of General Chemistry, and Director of the Laboratory of General Chemistry,*

ANDREW C. McLAUGHLIN, A.M., LL.B., *Professor of American History.*

ASAPH HALL, JR., Ph.D., *Professor of Astronomy, and Director of the Observatory.*

ISRAEL C. RUSSELL, C.E., LL.D., *Professor of Geology.*

WARREN P. LOMBARD, A.B., M.D., *Professor of Physiology and Histology.*

JACOB E. REIGHARD, Ph.B., *Professor of Zoology, and Director of the Zoological Laboratory and the Zoological Museum.*

THOMAS C. TRUEBLOOD, A.M., *Professor of Elocution and Oratory.*

JAMES A. CRAIG, Ph.D., *Professor of Semitic Languages and Literatures and Hellenistic Greek.*

JOHN C. ROLFE, Ph.D., *Professor of Latin.*

J. PLAYFAIR McMURRICH, Ph.D., *Professor of Anatomy.*

ROBERT M. WENLEY, Sc.D., D. PHIL., *Professor of Philosophy.*

ELIZA M. MOSHER, M.D., *Professor of Hygiene.*

GEORGE A. HENCH, Ph.D., *Professor of Germanic Languages and Literatures.*

GEORGE HEMPL, Ph.D., *Professor of English Philology and General Linguistics.*

FREDERICK G. NOVY, Sc.D., M.D., *Junior Professor of Hygiene and Physiological Chemistry.*

EDWARD D. CAMPBELL, B.S., *Junior Professor of Analytical Chemistry.*

FRED M. TAYLOR, Ph.D., *Junior Professor of Political Economy and Finance.*

FRED N. SCOTT, Ph.D., *Junior Professor of Rhetoric.*

ALEXANDER ZIWET, C.E., *Junior Professor of Mathematics.*

\*GEORGE W. PATTERSON, JR., A.M., S.B., *Junior Professor of Physics.*

FREDERICK C. NEWCOMBE, B.S., Ph.D., *Junior Professor of Botany.*

ALFRED H. LLOYD, Ph.D., *Assistant Professor of Philosophy.*

CHARLES H. COOLEY, Ph.D., *Instructor in Sociology.*

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\*Absent on leave for the year 1898-99.

# **ANNOUNCEMENT OF THE GRADUATE SCHOOL.**

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## **GENERAL INFORMATION.**

### **The University of Michigan.**

The University of Michigan is a part of the educational system of the State, and derives from the State, in one way or another, the greater part of its revenue. The University comprises the Department of Literature, Science, and the Arts, and six professional schools, each of which has its own Faculty and issues each year a separate departmental Announcement. In the several faculties there were, in 1897-98, one hundred and forty-one officers of instruction besides numerous assistants, some of whom participated in the work of teaching. Including the Summer Schools, 3,223 students, representing forty-nine States and Territories, and ten foreign countries, were in attendance.

### **The Department of Literature, Science, and the Arts.**

In the Department of Literature, Science, and the Arts, the aim is to cover the broad field of general university study of the ancient and the modern languages and literatures, of history, philosophy, science, and the liberal arts, as distinguished from the more special work of the professional schools. Its faculty numbered, in 1897-98, eighty-three regular teachers and twelve assistants. The students in attendance numbered over thirteen hundred, of whom seventy-six were graduates. The presence of such a number of graduate students, taken with the fact that high specialization of work is not uncommon among undergraduates, tends to create a genuine university atmosphere, and to assure the advanced student of intellectual comradeship.

### **The Libraries.**

The various libraries of the University contain nearly 114,000 volumes, and include a number of important special collections. Among these are the McMillan Shakespeare Library, 4,354 volumes; the Parsons

Library (political science), 4,325 volumes; the Hagerman Collection (history and political science), 2,660 volumes, and the Goethe Library of 940 volumes. The general reading room seats two hundred and ten readers, and separate rooms are provided for advanced students to work in, with the necessary books close at hand. Under certain restrictions graduate students have access to the book rooms. The library takes six hundred and twenty-five periodicals, and is open, in term time, fourteen hours daily, except on Sundays and legal holidays. During the summer vacation it is open nine hours a day for the six weeks of the Summer School, and six hours a day for the remainder of the time.

### **The Laboratories.**

The University has an observatory and a large number of laboratories more or less fully equipped for routine instruction and for original research. These laboratories (omitting those connected exclusively with the work of the Engineering, Medical, and Dental Schools) are: the Botanical, Chemical, Geological, Histological, Hygienic, Physical, Physiological, Psychological, and Zoological. For a fuller account of them and their various resources, as also of the University collections for the study of art, archæology, ethnology, mineralogy, palæontology, systematic zoology, etc., consult the annual Calendar, which may be had gratis on application to Mr. James H. Wade, Secretary of the University.

### **Societies.**

There are connected with the University a number of voluntary literary, philosophical, and scientific organizations which add not a little to the graduate student's opportunities for general training. The membership of these societies consists usually of University teachers and advanced students who are pursuing a common specialty. They are variously organized and meet weekly, fortnightly, or monthly, as the case may be, for the reading and discussion of formal papers, for reports upon observation and experiment, reviews of recent literature, etc.

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## **ORGANIZATION OF GRADUATE WORK.**

### **The Graduate School.**

The Graduate School was organized in the Spring of 1892 in connection with the Department of Literature, Science, and the Arts. Its purpose is to bring into increased prominence the numerous advanced courses offered in that department—courses that have developed during

the past few years from the continual extension of the elective system,—and to recognize and announce them as something distinct from the work of an ordinary college course. It aims to make provision for a more systematic and efficient administration of this higher work, and, so far as possible, for the separate instruction of graduate students. It also aims to lay foundations for the future development of university (as distinguished from collegiate) work. The management of the School is entrusted to an Administrative Council, of which the President of the University is chairman.

The regulations of the University respecting graduate work, that were formerly in force, have been modified in a few particulars by the Council, and it is possible that still further changes may be made in the year to come. The more important of these regulations are explained in the pages that follow.

### **The University System.**

Every graduate student who is a candidate for a higher degree, works upon the so-called 'university system,' the essential features of which are specialization of study, a final examination, and a thesis. The student selects a 'major study' and, in general, two 'minor studies,' his selection being subject, however, to the approval of the Council. When the choice has been made and approved, the student's work is henceforth under the immediate supervision of a committee consisting of those professors who have charge of the studies chosen, the one having charge of the major study being chairman. This committee arrange a course of study suited to the desires, needs, and previous attainments of the student, assist him in the choice of a subject for a thesis, pass judgment upon his thesis when it is written, conduct his examination, and, if he passes, report him to the Council as worthy of the degree sought. The nature of the work prescribed, and of the committee's oversight, varies more or less according to the subject chosen, the degree sought, and the previous attainments of the student. The work may consist of attendance upon certain specified courses of study, of reading to be done privately and reported upon, or of an original research to be carried on more or less independently. The requirement of a thesis is sometimes waived in the case of a candidate for a *master's* degree. It may be added also that for the master's degree the Council may, at their discretion, approve a course of study which does not confine the candidate rigorously to a major and two minor studies.

Graduate students who do not wish to work for a higher degree are admitted to any course offered in the Department of Literature, Science, and the Arts, upon satisfying the professor in charge that they are qualified to pursue the work to advantage.

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## THE HIGHER DEGREES.

### Degrees Conferred.

The degrees conferred on the completion of approved courses of study in the Graduate School are those of Master of Arts, Master of Philosophy, Master of Science, Master of Letters, Doctor of Philosophy, and Doctor of Science.

### The Masters' Degrees.

A Bachelor of this University, or of any other reputable university or college, may become a candidate for the corresponding master's degree, and may be recommended for the degree after one year's residence at the University, provided he pass a satisfactory examination on the course of study approved by the Administrative Council. A thesis may, or may not, be included in the requirements for a degree, as the committee in charge of the student's work may determine.

The practice of allowing graduates of this University to enter upon studies *in absentia* as candidates for a master's degree, has been discontinued. But a graduate who has already completed a considerable portion of the term of residence prescribed for a master's degree, may be allowed to continue his studies for the degree, without further residence at the university, on such conditions as the Administrative Council may determine in each case. *This privilege is restricted to graduates of this University.*

A student properly qualified may be permitted to pursue at the same time studies for a master's degree, and studies in any of the professional schools, on condition that the term of study and residence in the Graduate School be extended to cover at least two years.

### The Doctors' Degrees.

1. The degree of Doctor of Philosophy is open to all persons who have received a bachelor's degree; those persons, however, who pursue studies along scientific lines, may at their option receive the degree of Doctor of Science; but no student will be accepted as a candidate for the doctor's degree who has not a knowledge of French and German sufficient for purposes of research.

2. It is not intended that the doctors' degrees shall be won merely by faithful and industrious work for a prescribed time in some assigned course of study, and no definite term of required residence can be specified. As a rule, three years of graduate study will be necessary, the last two semesters of which must be spent at this University. The period of three years, however, may be shortened in the case of students who, as undergraduates, have pursued special studies in the direction of their proposed graduate work.



3. No student will be enrolled as a candidate for a doctor's degree until he has been in residence as a graduate student for at least one year. [This rule may be waived in the case of those who come properly accredited from a Graduate School of some other University, and of those who, as undergraduates in this University, have shown special proficiency in the line of their proposed graduate work.]

4. A student wishing to become a candidate for a doctor's degree must make a formal application to be so enrolled at least two semesters prior to the time of presenting himself for examination.

5. A candidate for a doctor's degree must take a major study that is substantially co-extensive with some one department of instruction in the University. He must also take two minor studies, one of which may be in the same department as the major, but involving a more thorough treatment of the same. Both minors must be cognate to the major, and all studies must be subject to the approval of the Administrative Council.

6. **THE THESIS.**—The thesis is of great importance. It must exhibit creditable literary workmanship and a good command of the resources of expression, but it must depend for acceptance more upon its subject-matter than upon its formal or rhetorical qualities. It must be an original contribution to scholarship or to scientific knowledge. The inquiry should be confined within narrow bounds. The treatment should be as concise as the nature of the subject permits, and show familiarity with the history of the problem treated, with the literature bearing upon it, and with the latest methods of research applicable to it. Every thesis should contain a clear introductory statement of what it is proposed to establish or investigate, and likewise a final résumé of results. It should also be accompanied by an index of contents and a bibliography of the subject. It is expected that the preparation of an acceptable thesis will usually require the greater part of an academic year.

### **Special Regulations Relating to the Higher Degrees.**

1. Applicants for an advanced degree are required to announce to the Council, through the Secretary, as early as the fifteenth of October of each year, the particular branches of study to which they wish to give special attention. The supervision of their work will then be entrusted to the proper committee.

2. The subject of the thesis for a doctor's degree must be chosen, and must be approved by the committee concerned, as early as the first of November of the college year in which the applicant expects to take his degree, and the subject of the thesis, when required for a master's degree, must be chosen and approved as early as the first of December.

3. The thesis must be completed and put into the hands of the chair-

man of the proper committee as early as the first of May of the year in which the applicant expects to take the degree.

4. The thesis must be prepared for close scrutiny with reference not only to its technical merits, but also to its merits as a specimen of literary workmanship. It must be preceded by an analytical table of contents, and a carefully prepared account of the authorities made use of.

5. The thesis must be read and defended in public at such time as the Council may appoint; and, in case of a master's degree, a bound copy, either written or printed, must be deposited in the University library.

6. Candidates for the degree of Doctor of Philosophy or Doctor of Science, in case of the acceptance of their theses, are required to have the accepted theses printed, in full or in part as may be approved by the responsible committee, and to present twenty-five copies of the same to the University library. To guarantee the printing of the thesis every candidate for a doctor's degree will be required to deposit with the Treasurer of the University, between the date of the acceptance of his thesis and the time fixed for his examination, the sum of fifty dollars, which deposit will be returned to him in case of failure to pass his examination, or whenever he shall cause his thesis to be printed at his own expense, or shall have it published in a form and under auspices approved by the responsible committee.

In the printing of the thesis at his own expense the candidate will be expected to use good substantial paper and slightly typography. A page four inches by six, with outside margins of at least one inch, is recommended.

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## ADMISSION AND REGISTRATION.

All applicants for admission to the Graduate School must first report to the Dean of the Department of Literature, Science, and the Arts, and present their credentials. They will then be referred to the Secretary of the Administrative Council for the arrangement of courses of study.

The privileges of the school are open to graduates of the Department of Literature, Science, and the Arts of this University, and to graduates of other universities and colleges who satisfy the Administrative Council that they are qualified to pursue with profit the advanced courses of study offered in the school.

Graduates of institutions where the undergraduate courses of study are not substantially equivalent to the course prescribed at this University will ordinarily be required to do an additional amount of undergraduate work, or to prolong their term of residence, before being admitted to full candidacy for a higher degree.

Graduates of this University, or of other institutions, who do not wish

to become candidates for a degree, may be admitted and registered as special resident graduates.

Graduates of other institutions who are candidates for a bachelor's degree in the Department of Literature, Science, and the Arts, are not registered in the Graduate School.

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## FEES AND EXPENSES.

**Matriculation Fee.**—Every student before entering any department of the University is required to pay a matriculation fee. This fee, which for citizens of Michigan, is ten dollars, and for those who come from any other state or country, twenty-five dollars, is paid but once, and entitles the student to the privileges of permanent membership in the University.

**Annual Fee.**—In addition to the matriculation fee, every student has to pay an annual fee for incidental expenses. This fee in the Department of Literature, Science, and the Arts is, for Michigan students, thirty dollars; for all others, forty dollars. It is paid the first year of residence at the University, and every year of residence thereafter. Resident graduates are required to pay the same annual fee as undergraduates. Graduate students studying *in absentia* for a master's degree pay an annual fee of ten dollars.

The matriculation fee and the annual fee must be paid at the beginning of the academic year. A by-law of the Board of Regents provides that no student or graduate shall be allowed to enjoy the privileges of the University until he has paid all fees that are due.

**Laboratory Expenses.**—Students who pursue laboratory courses of study are required to pay for the materials and apparatus actually consumed by them. The deposits required in advance are different in the different courses, ranging from one to twenty dollars. The laboratory expenses of students will vary with their prudence and economy. Experience has shown that in the chemical laboratory the average expense for all courses is about one dollar and twenty cents a week.

**Diploma Fee.**—The fee for the diploma given on graduation is ten dollars, and the by-laws of the Board of Regents prescribe that no person shall be recommended for a degree until he has paid all dues, including the fee for diploma.

**Other Expenses.**—Students obtain board and lodging in private families for from three to five dollars a week. Clubs are also formed in which the cost of board is from one dollar and a half to two dollars and a half a week. Room rent varies from one dollar to three dollars a week for each student. The annual expenses of students, including clothing

and incidentals, are, on the average, about three hundred and seventy dollars. Students on arriving in Ann Arbor can obtain information in regard to rooms and board by calling at the Steward's office.

There are no dormitories, no commons, and no stipends available for students in the Graduate School (with the exception of the Elisha Jones classical fellowship).

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## COURSES OF INSTRUCTION.

The following list of advanced courses does not attempt in all cases to discriminate graduate from undergraduate instruction; the reason being that the possession of a bachelor's degree may mean much or little as regards a student's proficiency in a particular subject. With a few exceptions, the courses here mentioned all presuppose a somewhat extensive preliminary study of the subject, a study covering from one to six or more years, according to the circumstances. In some instances the attempt is made to indicate, in terms of both time and work, the amount of preparation required for entrance upon the courses described. Many of the courses are advanced electives which are open to undergraduates, but have been shown by experience to be suited to the needs of many graduates. Different departments of instruction have adopted different modes of announcing their work. For further information reference may be made directly to the head of the department concerned.

### GREEK.

The courses here announced presuppose, in general, four years' previous study of Greek, viz., the usual preparatory course of two years, and two years of collegiate study devoted to the history of Greek literature and to reading from Lysias, Xenophon, Homer, Demosthenes, the Tragic Poets, and Aristophanes.

Professor D'OUGE:—

#### Teachers' Seminary.

This course is intended to give students who expect to teach Greek training in teaching the elements of inflection and syntax. Lectures are given on the chief results of the modern comparative treatment of Greek sounds and inflections.—*Two hours a week, first semester.*

#### Seminary in Tragedy.

Interpretation of the *Orestes* of Aeschylus, with special reference to the principles of Greek dramatic art, and the chief problems of textual criticism.—*Three hours a week, first semester.*

The History of Greek Art from the beginnings to the Roman Period.

Gardner's Handbook of Greek Sculpture and Collignon's Manual of Greek Archæology are made the basis of a more general study.—*Three hours a week, first semester.*

Studies in Plato's Republic.

*Two hours a week, first semester.*

Pindar, the Olympian and Pythian Odes, and Bacchylides.

*Three hours a week, second semester.*

Modern Greek.

Reading of selections from the best modern Greek writers.—*Two hours a week, second semester.*

Greek Antiquities.

Lectures on the private life of the ancient Athenians. Illustrated by stereopticon views.—*One hour a week, second semester.*

Professor PATTENGILL:—

Studies in Thucydides.

*Three hours a week, first semester.*

The Greek Pastoral Poets.

*Three hours a week, second semester.*

Dr. WAIT:—

Introduction to Greek Epigraphy, and Reading of Inscriptions.

*Two hours a week, first semester.*

Teachers' Course.

Greek writing.—*Two hours a week, second semester.*

#### LATIN.

The courses here announced presuppose, in general, seven or eight years' previous study of Latin, viz., the usual preparatory course of four years, and three or four years of collegiate study devoted to Livy, Cicero, Horace, Terence, Latin writing, and the systematic study of Roman literature.

The courses in ancient philosophy (see page 30) are strongly recommended to classical students.

## Professor KELSEY:

## Latin Seminary: The Roman Satirists.

Open to graduate students only.—*Two hours a week, throughout the year.*

## Caesar's Gallic War (Teachers' Course, A).

Lectures. Papers prepared by those taking the course. Critical study of the text of the Gallic War, on the basis of Meusel's edition; studies in the syntax and military antiquities.—*Five hours a week, first semester.*

## Virgil (Teachers' Course, B).

Critical study of select portions of the Bucolics, Georgics, and Aeneid, on the basis of Ribbeck's large edition.—*Three hours a week, second semester.*

## Juvenal and Persius.

Interpretations and lectures.—*Two hours a week, first semester.*

## Introduction to Classical Philology.

Lectures. A brief outline of the history and present condition of classical studies is presented, followed by an extended discussion of the methods employed in classical philology. Attention is also paid to the bibliography of the subject.—*Three hours a week, second semester.*

## [Introduction to Roman Archæology.

Lectures on the architecture and topography of Ancient Rome, and on sculpture and painting in the Roman period. This course will be illustrated by photographs, engravings, and the occasional use of stereopticon slides.—*Four hours a week, second semester.* This course is omitted in 1898-99.]

## [Latin Inscriptions.

Reading of inscriptions of different periods from squeezes and facsimiles. Interpretation of inscriptions with special reference to the study of life and society under the Early Empire.—*Three hours a week, second semester.* This course is omitted in 1898-99.]

## Professor ROLFE:—

## Latin Grammar.

Lectures on the phonology and morphology of the Latin language, with an outline of the syntax scientifically considered. *Three hours a week, first semester.*

Proseminary in Latin Grammar.

Studies in Latin syntax.—*Two hours a week, second semester.*

The Italic Dialects.

Lectures on the phonology and morphology of the dialects, with the interpretation of selected inscriptions.—*Two hours a week, second semester.*

The Letters of Pliny the Younger.

Interpretation of selected letters with a study of Roman life and society at the end of the first century, A. D.—*Three hours a week, first semester.*

The Letters of Cicero.

Interpretation of selected letters, with a study of the Latin epistolary style.—*Three hours a week, second semester.*

Professor ROLFE and Mr. DENNISON:—

Latin Writing (A).

Attention is given not only to correctness of expression but also to matters of style and the finer distinctions of the language.—*Two hours a week, first semester.*

Latin Writing (B).

Lectures on Latin style, with collateral reading and written exercises.—*Two hours a week, second semester.*

Assistant Professor DRAKE:—

[Roman Political Institutions (B).

Lectures, presenting a systematic analysis of the governmental institutions of the Roman Empire.—*Two hours a week, first semester.*  
This course is omitted in 1898–99.]

Historical Proseminary.

Study of historical subjects from the sources: The age of the Antonines.—*Two hours a week, first semester.*

[Selections from the Annals of Tacitus.

Interpretations and lectures.—*Three hours a week, first semester.*  
This course is omitted in 1898–99.]

[Suetonius and Velleius Paterculus.

Lectures and interpretations.—*Three hours a week, first semester.*  
This course is omitted in 1898–99.]

### The Tusculan Disputations of Cicero.

Rapid reading, with an examination of Cicero's philosophical views.—*Three hours a week, second semester.*

### Roman Law.

Lectures. History of Roman legislation to the time of Justinian. The Institutes of Justinian. Points of similarity and contrast between Roman and English law.—*Three hours a week, first semester.*

Professors KELSEY and ROLFE and Assistant Professor DRAKE:—

### Reports on the progress of research.

Analysis and criticism of important articles in the domain of the Latin language and literature, Latin grammar and lexicography, Roman history, and Roman archæology and antiquities, by members of the faculty and members of the Latin Seminary.—*Two hours a week, throughout the year.*

Dr. GRANRUD:—

### Roman Political Institutions (A).

Lectures. This course deals with the development of the Roman constitution to the end of the Republic. Special attention is given to the problems that arose in the transition from the Republic to the Empire, and to the political views of Cicero and his contemporaries.—*One hour a week, first semester.*

Dr. DENNISON:—

### Introduction to Latin Palæography.

Lectures on the various styles of writing found in Latin manuscripts, with exercises in reading from facsimiles.—*One hour a week, second semester.*

Mr. MEADER:—

### [Christian Latin.

Interpretation of selections from the early Latin writers of the Christian church, with illustrative lectures upon Christian archæology and antiquities.—*Three hours a week, second semester.* This course is omitted in 1898-99.]

### SANSKRIT.

Before beginning the study of Sanskrit, the student should have pursued courses in Greek and Latin for at least four semesters or, instead of either Greek or Latin, Germanics of the early period.



Dr. WAIT:—

Beginners' Course.

Grammar, and exercises in translation and composition. Text-books: Perry's Sanskrit Primer and Whitney's Grammar. *Three hours a week, first semester.*

Second Course.

Interpretation of the prose selections contained in Lanman's Sanskrit Reader, with elementary studies in the comparative morphology of the more important cognate languages. *Three hours a week, second semester.*

**SEMITICS.**

The courses in Semitics are intended for:—(1) students who are seeking a liberal culture; (2) students of "classical" and modern languages, to furnish them with *necessary* data for the study of the philosophy of language and phonetic laws; (3) students who wish to make a special study of Semitics (the courses leading to the degree of Doctor of Philosophy); (4) students of ancient history; (5) students of art and archæology; (6) students of ethics and theology.

Professor CRAIG:—

Hebrew.\*

1. Genesis. Baer and Delitzsch's Text. Harper's Elements of Grammar. Craig's Hebrew Word Manual. *Three hours a week, first semester.*

2. Deuteronomy, Joshua, I Samuel, Ruth, Jonah. Theile's Biblia Hebraica. Davies's Lexicon. *Three hours a week, second semester.*

3. Prophetic Literature: Amos and Isaiah. Study of the nature and content of prophecy in its literary, historical, and ethical aspects. Text-books: Hebrew Bible, Driver's Hebrew Moods and Tenses. *Two hours a week, first semester.*

4. The Book of Job, including study of the literary structure and critique of the dominant ideas. Baer and Delitzsch's Text and Haupt's Polychrome Edition (text by Siegfried). *Two hours a week, second semester.*

Assyrian.

1. Introduction to Easy Historical Inscriptions from the Ninth Century, B. C., with study of the grammar. Text-books: Delitzsch's

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\*Candidates for a higher degree who wish to elect a Semitic language as one of the subjects leading to the degree, must have previously completed Courses 1 and 2 in Hebrew or an equivalent thereto in some Semitic language.

Assyrische Lesestücke, dritte Auflage. *Three hours a week, first semester.*

2. Historical Inscriptions. Selections from the Cuneiform Inscriptions of Western Asia (R. I-V). *Second semester.*

3. The Babylonian Stories of Creation, the Deluge, and the War of Marduk against Tiamat, with lectures on the Cosmology of the Babylonians. Inscription of Tiglathpileser I, circa 1120 B. C. *Two hours a week, first semester.*

4. Religious Literature. King's "The Prayers of the Lifting-up of the Hand." Craig's "Religious Texts." *Second semester.*

5. Seminary in Sumerian. *Two hours a week, first semester.*

### History and Archæology.

Lectures on the Ancient Babylonians, Assyrians, Hebrews, Phoenicians. The lectures are based on the study of the monuments.

### Arabic.

1. Introductory Course. Grammar and reading. Socin's Arabic Grammar (English edition) and Brünnow's Chrestomathy. *Two hours a week, first semester.*

2. Selected Suras from the Quran, Chrestomathia Qurani Arabica, Nallino, with introductory lectures on the life of Muhammed and Muhammedanism. *Two hours a week, first semester.*

### HELLENISTIC GREEK.

Professor CRAIG:—

#### New Testament.

Gospel of John, including grammatical study of the peculiarities of Hellenistic Greek, and historical introduction to the book. Text-Books: Westcott and Hort's Greek New Testament, revised edition with introduction by Ph. Schaff; Thayer's Winer's New Testament Grammar; Thayer's Greek-English Lexicon.—*Two hours a week, first semester.*

#### Septuagint.

Introductory lectures with selected readings from the historical and prophetic books. Apocrypha; Maccabees, Books I and II. Text-books: Vetus Testamentum Græce by L. Van Ess, or The Old Testament in Greek by H. B. Swete, Vols. I-III. Grammar and lexicon as in the first semester, and Liddell and Scott's Lexicon.—*Two hours a week, second semester.*

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**FRENCH.**

Students will not be considered as taking graduate work in French, whether graduates of this University or of any other institution, who have not had the equivalent of at least Courses 1, 2, 3, 6, 7, 8, 20, and 21, as given in the undergraduate department of the University and described in the University Calendar for 1897-98, pages 63 to 65. These courses include grammar and composition, the reading of classic and modern prose, and the classic and modern drama.

Graduate work is either chiefly literary or chiefly linguistic, but it is expected that for the doctor's degree at least, and it is advised that for the master's degree as well, some work shall be done in both directions.

For students who choose to direct their work chiefly to the literature, opportunity will be given in the *first semester* of 1898-99 to study the Eighteenth Century dramatists, the Sixteenth Century literature, and some of the leading French philosophical writers; in the *second semester* the Seventeenth Century literature, the pre-revolutionary literature, Voltaire, Montesquieu, Rousseau, etc., the romantic movement at the beginning of the present century, and the satirical spirit in French literature. Private work will be assigned when it is thought desirable by the Professor in charge.

The oldest French literature will be studied in connection with the study of Old French, which will be continued *throughout the year*.

A teachers' course in French will be open to candidates for a master's degree who intend to teach that language.

The courses in French will be given by, or under the direction of, Professor WALTER.

**ITALIAN.**

Students will not be considered as taking graduate work in Italian, who have not had the equivalent of Courses 1 and 2 as described in the University Calendar for 1897-98, pages 65 and 66. In 1898-99, courses in Dante's *Divina Commedia* and *Vita Nuova* will be offered.

The courses in Italian will be given by, or under the direction of, Professor WALTER.

**SPANISH.**

Students will not be considered as taking graduate work in Spanish, who have not had the equivalent of Courses 1 and 2 as described in the University Calendar for 1897-98, page 66. In 1898-99, dramas of Lope and Calderon will be offered.

The courses in Spanish will be given by, or under the direction of, Professor WALTER.

**GERMAN.**

The advanced and graduate courses in German, announced below, presuppose a reasonably thorough and extended knowledge of the writ-

ten and spoken language and an acquaintance with some of the masterpieces of modern German literature, both of which may be obtained from the undergraduate work not here mentioned. The minimum requirement of undergraduate preparation for the graduate courses consists in Courses 1, 2, 3, 4, 5<sub>a</sub>, 6<sub>a</sub>, and options in 5<sub>a-c</sub> and 6<sub>a-c</sub> as described in the University Calendar for 1897-98, pages 66 to 68, or work equivalent to the courses mentioned.

Courses 5<sub>a</sub>, 5<sub>b</sub>, 5<sub>c</sub>, 6<sub>a</sub>, 6<sub>b</sub>, and 6<sub>c</sub> are primarily intended for undergraduates, but are recommended for graduates who wish to study the chief dramas of the classical period.

Professor HENCH:—

### Middle High German.

Lectures and recitations with assigned readings. This course is intended to serve as an introduction to Middle High German; incidentally it includes a brief sketch of the historical development of Modern German phonology and inflection. Paul, *Mittelhochdeutsche Grammatik*, 4 Aufl., and Bachmann, *Mittelhochdeutsches Lesebuch*. Advanced course open to undergraduates and graduates.—*Three hours a week, first semester.*

### Modern German Sounds.

With a series of introductory lectures on the Rise of the Modern German Schriftsprache and on the elements of Phonetics. Text-book, Hempl, *German Orthography and Phonology*. Advanced course open to undergraduates and graduates.—*Two hours a week, first semester.*

### German Syntax.

Lectures based upon Wunderlich, *Der deutsche Satzbau*, and Erdmann, *Grundzüge der deutschen Syntax*, with reports upon assigned topics. Advanced course open to undergraduates and graduates.—*Three hours a week, second semester.*

### History of German Literature.

Lectures, and readings from Max Müller's *German Classics*. A survey of German literature in its development from the beginnings down to the death of Goethe, with special regard to important epochs, notable literary monuments, and underlying intellectual movements. Advanced course open to undergraduates and graduates.

I. From the earliest time to the end of the Middle Ages.—*Three hours a week, first semester.*

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Proseminary in Middle High German.

Minnesang's Frühling and Walther von der Vogelweide. Primarily for graduates.—*Two hours a week, second semester.*

Assistant Professor WINKLER:—

Goethe's Faust.

Lectures and recitations. Thomas's edition. Advanced course open to undergraduates and graduates. *Two hours a week, throughout the year.*

History of German Literature.

II. Modern Period.—*Three hours a week, second semester.*

German Romanticism.

Lectures and assigned readings. The beginnings of German Romanticism. Influence of Kant, Fichte, and Schelling upon the Romantic movement. Its relation to German Classicism and to the social and political life of the times. The younger Romantic movement. The period of the wars of liberation. The intellectual movement leading to the revolution of 1848. Advanced course open to undergraduates and graduates.—*Two hours a week, throughout the year.*

Proseminary in Modern German Literature.

The Storm and Stress Movement. Primarily for graduates.—*Two hours a week, first semester.*

Dr. ROEDDER:—

Old Saxon.

Lectures and recitations. Gallee, Altsächsische Grammatik, and Behaghel, Heliand. Primarily for graduates.—*Two hours a week, second semester.*

Dr. FLORER:—

The Literature of the Sixteenth Century.

Lectures, and reading of selections from Braune's Neudrucke deutscher Litteraturwerke des XVI und XVII Jahrhunderts. Advanced course open to undergraduates and graduates.—*Two hours a week, throughout the year.*

**GOTHIC.**

Dr. MENSEL:—

## Introductory Course.

Lectures on phonology and morphology, and reading of the Gospels. Text-books: Braune's *Gotische Grammatik*, 4 Aufl., or Balg's translation of Braune, 2 ed. Primarily for graduates.—*Two hours a week, first semester.*

Professor HENCH:—

## Proseminary in Gothic Syntax.

Primarily for graduates.—*Two hours a week, second semester.*

**SCANDINAVIAN.**

Professor HENCH:—

## Old Norse.

The Elder Edda. Jonsson, *Eddalieder*, *Altnordische Textbibliothek*, No. 2-3. Lectures on mythology, heroic legend, and metre. Primarily for graduates.—*Two hours a week, first semester.*

**ENGLISH PHILOLOGY AND GENERAL LINGUISTICS.**

Professor HEMPL:—

## Old English.\*

A general introduction to the subject.—*Two hours a week, first semester.*

## Old English Phonology and Morphology.

A study of early West-Saxon prose, with special reference to sound and inflection.—*Three hours a week, second semester.*

## [Old-English Syntax.

The investigation of specific problems, together with a brief general survey of the subject.—*Two hours a week, first semester.* This course is omitted in 1898-99.]

## [Old English Poetry.

A study of early English literature, with special reference to the poetical monuments.—*Three hours a week, second semester.* This course is omitted in 1898-99.]

\*The term "Old English" is used in this Announcement for the period of English often called "Anglo-Saxon."

### Middle English.

A brief introduction to the subject and a special study of some problem or group of problems.—*Two hours a week, first semester.*

### [Historical English Grammar.

A general survey of the subject, and the investigation of the origin and development of impugned Modern-English idioms.—*Two hours a week, first semester.* This course is omitted in 1898-99. See the following course.]

### The History of the English Language.

Lectures on the most important factors in the development of the English language, together with the investigation of certain problems of general interest.—*Two hours a week, first semester.*

### Spoken English.

A study of colloquial English as distinguished from the English of books and of formal speech, and the investigation of the more important facts as to the fortunes of English speech in this country.—*Two hours a week, second semester.*

### [Phonetics.

A study of the elements of speech-sounds, with application to the chief ancient and modern languages.—*Two hours a week, second semester.* This course is omitted in 1898-99, but a brief outline of the subject is given in the course on Spoken English.]

### Principles of Linguistic Science.

Lectures on the more important principles underlying the life and growth of language. This course is intended to furnish to students of either classical or modern languages an explanation of the many phenomena of the languages they are studying, and to bring these scattered data under a limited number of general principles.—*Two hours a week, second semester.*

## ENGLISH AND RHETORIC.

The advanced work of this department proceeds along two main lines:—English and American Literature, and Rhetoric. Advanced courses in Oratory are also offered in connection with this department.

The following courses (open also to undergraduates who are prepared to take them) will ordinarily be found adapted to the needs of graduate students. In case of students who have specialized in English for their

first degree, additional advanced courses for graduate study are provided after conference with the candidate. Some of the courses given in recent years are the following: The Development of the English Novel; The English Satirists of the Seventeenth and Eighteenth Centuries; The Romantic Revival in England at the close of the last century; The Pre-Shakespearian Drama in England; Shakespeare's Histories.

See also the courses in English Philology and General Linguistics on pages 22 and 23.

Professor DEMMON:—

### English Literature Seminary.

Each student is expected, first, to present two papers during the semester, one an essay upon an assigned masterpiece, the other a critique of a fellow-student's essay; second, to participate each week in a general *ex tempore* discussion of the work under consideration; third, to read the entire list of works with which the course deals, together with such critical literature on each subject as there may be time for. The aim of the course is to lay a foundation for correctly estimating literary masterpieces of widely varying types. The list of masterpieces is as follows: More's Utopia; Bacon's Essays; Milton's Areopagitica; Carlyle's Sartor Resartus; George Eliot's Silas Marner; Spenser's Faery Queen, Book I; Shakespeare's Sonnets; Milton's Paradise Lost; Dryden's Absalom and Achitophel; Pope's Essay on Man; Wordsworth's Excursion; Browning's Soul's Tragedy; Tennyson's Maud; Swinburne's Atalanta in Calydon.—*First semester.*

### Shakespeare Seminary.

The method is similar to that in the preceding course. The plays selected are: A Midsummer Night's Dream; The Merchant of Venice; As You Like It; Twelfth Night; The Tempest; Richard III; the two parts of Henry IV; Henry V; Hamlet; Othello; King Lear; Macbeth; Coriolanus.—*Second semester.*

### American Literature Seminary.

Authors studied: Irving, Poe, Hawthorne, Bryant, Longfellow, Emerson, Thoreau, Bayard Taylor, Whittier, Holmes, Lowell, Howells and James. Representative works of the authors named are studied, and an attempt is made to discover the distinctively American element by a comparative study with British authors.—*Second semester.* When this subject is taken for an advanced degree, individual work is assigned for the first semester, upon which the candidate is expected to make weekly reports.



### Principles of Criticism.

Lectures. Candidates who take their major in English Literature are expected to take this course in connection with the seminary work in English Literature and Shakespeare.—*Throughout the year.*

### Studies in the text of Shakespeare.

The aim will be to illustrate the methods of textual study as applied to a play like Hamlet, and the difficulties to be overcome in establishing a text. The McMillan Shakespeare Library affords a very full apparatus for these studies.—*Two hours a week, first semester.*

### Professor SCOTT:—

#### Development of Rhetorical Theory.

A historical and comparative study of the growth of rhetorical theory from Aristotle to the present time.—*First semester.*

#### Principles of Style.

Inductive study of masterpieces of English prose, with a view to verifying rhetorical principles. Lectures, readings, and discussions.—*Second semester.*

#### Teachers' Course.

Methods of teaching English Composition and Rhetoric.—*Second semester.*

### HISTORY.

The graduate work described below presupposes such information and training as is represented by undergraduate Courses 1, 2, and 3 as described in the University Calendar for 1897-98, pages 74 and 75, supplemented by one or more advanced undergraduate courses. In indicating the courses named below as adapted to the needs of graduate students, it is not intended to exclude other advanced undergraduate courses, especially those in English constitutional history, in mediæval history, and in American colonial history, which, in certain cases, graduate students will be asked to take.

A large part of the work of the graduate student will consist of individual research and investigation carried on under the personal supervision of the professor in charge. To insure such supervision two seminaries have been organized primarily for graduates. The work of these seminaries has been so arranged that the same student may remain a member of the seminary for two or more years. In the library building are seminary rooms in which graduate students may carry on their

work. In these rooms is shelved the Hagerman collection of books on history and political science, including many works to which the student has frequent occasion to refer. As occasion requires, books in special lines are placed in the seminary rooms for the use of advanced students, and everything is done to make the library serve the purpose of research.

Professor HUDSON:—

### The History of Europe since 1789.

In the *first semester* a course will be given upon the political and social transformation of Europe since 1789. This will be followed in the *second semester* by a *three-hour* course upon the present problems of European politics.

### Seminary in European History.

During the *first semester* a study will be made of the social and political condition of Russia and its advance both in Europe and in Asia. The subject for the *second semester* will be Bismarck and his work. One of the objects in both of these courses is to train students in the use of original material.—*Three hours a week.*

### Political Institutions.

In the *first semester* the course will deal with English institutions; in the *second semester* with the institutions of Germany, Switzerland, France, and other European states.—*Two, or three, hours a week.*

These courses will be supplemented by others dealing with municipal institutions and problems.—*One hour a week.*

Professor McLAUGHLIN:—

### The Political and Constitutional History of the United States, 1776–1861.

The purpose of this course is the careful study of the origin of the Constitution, its interpretation in history, the development of our political system, and the growth and tendencies of political parties. The work is based upon lectures and the careful examination of prescribed texts. The student is expected also to read in the library and to form a wide acquaintance with the secondary, and with some of the primary, authorities. Weekly reports on the reading are required. Those who have not had a thorough course in colonial history will find it desirable to take undergraduate Course 13 (University Calendar for 1897–98, page 75) in connection with this course.—*Three times a week, throughout the year.*

### Seminary in American History.

The aim of the seminary is to guide and direct the student in the use of primary authorities and to give instruction in methods of research. Special subjects of investigation are assigned to members of the seminary, and regular reports are made. Students at work upon theses are expected to report difficulties and successes, and are guided in their work. During a portion of the year the more important constitutional questions of the rebellion and the period of reconstruction are discussed, and there is an examination of the leading documents of this period.—*Two hours a week, throughout the year.*

### Constitutional Law and Political Institutions of the United States.

In this course there is a consideration of the Constitution as it has been interpreted by the courts, and a study of our political system as it appears in action. Graduate students electing this work will be expected to read important texts, to examine leading cases, and to report on problems in politics and administration.—*Three times a week, for one semester.*

In addition to following the three courses just described, graduate students will meet periodically to make reports on current literature, to discuss new books, and to examine important political questions or decisions of the courts.

## PHILOSOPHY.

The advanced courses described below and marked with an asterisk presuppose instruction in logic, ethics, and general psychology; also a general introduction to philosophy, and a somewhat extended study of the history of philosophy, ancient, mediæval, and modern. Candidates for a higher degree who have not had a preparation equivalent to this will be expected to take certain of the lower courses, either before entering upon, or in connection with, their graduate work. Advanced courses bearing upon the history of philosophy are also given in the departments of Greek, Latin, French, and German. The courses in mathematics are strongly recommended for students specializing in philosophy.

### A. HISTORY OF PHILOSOPHY.

Professor WENLEY:—

#### \*The Philosophy of Kant.

Lectures, and study of the Critique of Pure Reason.—*Two hours a week, first semester.*

**\*The Philosophy of Hegel.**

Lectures, and study of the Logic.—*Two hours a week, second semester.*

Assistant Professor LLOYD:—

**The History of Philosophy.**

A general outline of the subject from Thales to the present century. The course is designed to state the development of philosophical problems and concepts, and thus to give the student his bearings in philosophy. It is therefore highly advisable, if this course has not been taken before beginning graduate work, that it be taken at once upon beginning it.—*Three hours a week, throughout the year.*

**\*Special Work in the History of Philosophy.**

The object of this course is to introduce the student to the methods of investigation and discussion in the subject. Hegel and Philosophy since Hegel are taken up alternately and given more detailed consideration.—*One hour a week, second semester.*

**Philosophy of History.**

Lectures and study of special periods.—*Two hours a week, first semester.*

Dr. REBEC:—

**British Philosophy.**

Lectures, and reading of Locke, Berkeley, and Hume.—*Two hours a week, first semester.*

**\*Plato's Republic.**

Collateral reading and theses.—*Two hours a week, first semester.*

**B. ETHICS.**

Professor WENLEY:—

**The Development of Ethical Ideas.**

A historical review of the growth of morality from its early appearance among savage tribes through the great civilizations of the ancient world to Christianity; concluding with some account of Christian influences.—*Two hours a week, first semester.*

Professor WENLEY and Assistant Professor LLOYD:—

**Ethics.**

Lectures, reading, theses.—*Three times a week, second semester.*

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Assistant Professor LLOYD:—

\*Special Work in Ethics. Metaphysic of Ethics.

*One hour a week, second semester.*

Dr. REBEC:—

\*Aristotle's Ethics.

Collateral reading and theses.—*Two hours a week, second semester.*

C. PSYCHOLOGY.

The Psychological Laboratory is well equipped for original investigation.

Dr. PILLSBURY:—

Beginners' Course in Experimental Psychology.

*Two hours a week, each semester.*

Second Course in Experimental Psychology.

*Two hours a week, second semester.*

\*Research course in Experimental Psychology.

*Six hours a week, throughout the year.*

Genetic Psychology.

*Two hours a week, first semester.*

General Psychology.

*Two hours a week, second semester.*

D. SPECIAL COURSES.

Professor WENLEY:—

[\*Philosophy since Hegel.

Lectures and reading.—*Two hours a week, second semester.* This course is omitted in 1898-99.]

[\*The Theory of Evolution.

A study of the metaphysical implications of modern science. Lectures, reading, thesis.—*Two hours a week, second semester.* This course is omitted in 1898-99.]

Assistant Professor LLOYD:—

Philosophy of Religion.

*Two hours a week, first semester.*

**Political Philosophy.**

A critical study of society, of sovereignty, rights, duty, and of the idea of the social organism.—*Two hours a week, second semester.*

Dr. REBEC:—

**Æsthetics.**

A historical review of leading theories and their connection with philosophical systems. Bosanquet's *History of Æsthetics* will serve as a basis of study.—*Two hours a week, first semester.*

**Special Æsthetics.**

Relation of philosophy to interpretation of poetry.—*Two hours a week, second semester.*

**E. GRADUATE SEMINARY.**

The Library of George S. Morris, late Professor of Philosophy in the University, has been given to the Philosophical Department. It contains about 1100 volumes covering the entire field of philosophical inquiry. They have been removed to the Morris Seminary Room which is reserved for the exclusive use of graduates and special students in Philosophy.

Professor WENLEY, Assistant Professor LLOYD, and Drs. REBEC and PILLSBURY.

**Graduate Seminary.**

The assignment of subjects is as follows: Professor WENLEY, Metaphysics, Ethics, and Ancient Philosophy; Assistant Professor LLOYD, History of Philosophy and Ethics; Dr. REBEC, Logic, Æsthetics, and Ancient Philosophy; Dr. PILLSBURY, General and Experimental Psychology.

**THE SCIENCE AND THE ART OF TEACHING.**

The objects sought in this department, as they are defined in the Calendar of the University for 1897-98, page 78, are partly practical and partly scientific. The one end is gained in preparing teachers professionally for teaching; the other, in promoting the study of teaching as a division of human knowledge. In the Graduate School more stress is laid upon the scientific phase of the subject than in undergraduate work.

Qualification for admission to graduate work may be dealt with under two heads.

I. General Education.—When teaching is studied as science, art, or history it becomes reflective; that is, it takes account of its own princi-

ples, methods, and development. Manifestly, a student cannot pursue pedagogical studies with profit unless he has an education broad enough to furnish him with a basis upon which to build. More than this, the fundamental ideas of teaching as a study are furnished by other studies. Pedagogy is a mixed science, having its presuppositions in other sciences. While a student who has taken any one of the purely literary degrees given by the University should be able to carry on this subject with advantage, the best work calls for an elementary acquaintance, at least, with physiology, psychology, logic, ethics, and æsthetics, for these are the sciences in which the presuppositions of pedagogy are found.

2. Special Preparation.—In this respect the department differs somewhat from most others. It cannot, under existing conditions, require previous study of the science, art, or history of education, because teaching, in only rare instances, is a subject of undergraduate instruction. Some candidates for the Graduate School have had such training; others have not. It is desirable that all who intend to pursue the subject in the School should have given some attention to it. A practical acquaintance with teaching as a teacher, principal, or supervisor is helpful; and so is a general knowledge of education and teaching derived from observation and reading current literature or standard works. It is desirable also that graduate students shall not find it necessary to take the most elementary work given in the department.

In respect to courses a few words must suffice. The theoretical and historical courses, and the courses in school supervision and in the comparative study of school systems, are all suitable for graduate students. If the courses as ordinarily pursued are not found adequate, they are re-enforced by outside reading. No graduate courses, so-called, are offered. Students who have taken courses in normal schools, or even in colleges, bearing the same names as those laid down in the Announcement and Calendar need have no fear of finding work they have already done merely duplicated. These courses are more extensive and thorough. For example, Compayré's History of Pedagogy is prescribed as a textbook, but is prescribed mainly to mark out, in a general way, a field that is cultivated much more broadly and deeply than it is cultivated by the author of the book.

Professor HINSDALE:—

### Theoretical and Critical.

The principles underlying the arts of teaching and school management expounded. Lectures and reading.—*Four hours a week, second semester.*

### School Supervision.

Embracing general school management, the arts of grading and arranging courses of study, classifying pupils, examinations and promotions, conduct of teachers' meetings and institutes, etc. Recitations and lectures.—*Three hours a week, first semester.*

### History of Education: ancient and mediæval.

Recitations and lectures. Text-book: Compayré's History of Pedagogy. The subjects treated in the lectures given in this course are oriental, Greek, and Roman education, and the rise and early development of Christian schools.—*Three hours a week, first semester.*

### History of Education: modern.

Recitations and lectures. Text-book: Compayré's History of Pedagogy. The topics dealt with in this course of lectures are the movements of modern educational thought and practice.—*Three hours a week, second semester.*

### The Comparative Study of Contemporary Educational Systems: domestic and foreign.

Besides a general survey of the institutional organization of education in the United States, similar surveys are made of several foreign countries, as Germany, Italy, France, and England. Lectures.—*Two hours a week, second semester.*

## POLITICAL ECONOMY AND SOCIOLOGY.

The strictly undergraduate courses in political economy represent the work of at least one academic year. These courses cover "Elements of Political Economy" and "Problems in Political Economy." For description see the University Calendar for 1897-98, page 80.

Of the courses enumerated below, those designated as "Intermediate Courses" are open to undergraduate as well as to graduate students, but special instruction will be afforded all graduate students in connection with these courses, this special instruction being devoted to a more careful analysis and a more extended discussion than is possible in the lectures. The courses designated as "Graduate Courses" are open only to graduate students, or to undergraduates making a specialty of political economy in their senior year.

### A. INTERMEDIATE COURSES.

Professor ADAMS:—

### History of the Development of Industrial Society.

This course embraces a history of English industrial society from



the twelfth century to the present time, and is designed to show how modern industrial customs and rights came into existence. As classified in the curriculum of the University of Michigan, it is regarded as introductory to all courses in political economy, and is usually taken before a study of the "Elements." It is inserted here because all advanced students do special reading upon industrial history.—*Two hours a week, second semester.*

### Transportation Problem.

This course traces the history of transportation as an industry, shows the social, industrial, and political results of modern methods of transportation, presents an analysis of the railway problem, and discusses the various solutions proposed.—*Two hours a week, second semester.*

### Seminary in Political Economy.

*First semester.*

### Seminary in Transportation.

*Second semester.*

## Professor F. M. TAYLOR:—

### History of Political Economy.

This course consists of assigned readings in political economy in connection with a study of Ingram's History of Political Economy. It is important that students who desire to specialize in economics should take this course.

### Principles of the Science of Finance.

Under the science of finance will be included a discussion of principles of public expenditure, public revenue, budgetary legislation, financial administration, public industries, and public debts.—*Two hours a week, second semester.*

### Money and Banking.

A mixed text-book and lecture course. This class will be examined in Jevons's Money and the Mechanism of Exchange, White's Money and Banking, and Dunbar's Theory and History of Banking, as well as upon lectures. Current and monetary problems will receive especial attention.—*Two hours a week, first semester.*

### Socialism, including Communism, Collectivism, Land Nationalism, State Socialism, etc.

*Two hours a week, second semester.*

Dr. COOLEY:—

### Theory and Practice of Statistics.

Lectures and practical exercises.—*One hour a week, first semester*

### Special Studies in Statistics.

*Two hours a week, second semester.*

### Principles of Sociology.

Lectures. This course aims at a systematic and comprehensive study of the underlying principles of social science. These principles are verified and illustrated by an examination of existing society.—*Three lectures a week, first semester.*

### Problems in Sociology.

This course embraces a study of the laws of population, the treatment of criminals, poor-relief, the assimilation of immigrants, the development of great cities, and other sociological questions of present importance.—*Three lectures a week, second semester.*

### Advanced Studies in Sociology.

This course is devoted to special study of sociological principles and problems, and consists of assigned readings and reports.—*Two hours a week, first and second semesters.*

## B. GRADUATE COURSES.

The strictly advanced instruction in economics and sociology is carried on partly by lectures, partly by assigned readings and reports, and partly by formal seminars designed to give practice in research. So far as lectures are concerned, it is organized as a solid course of three hours a week for three consecutive years. The course is given jointly by Professor ADAMS, Professor F. M. TAYLOR, and Dr. COOLEY, each instructor in turn claiming the attention of students for six consecutive weeks each semester. The subjects of instruction in each case are as indicated below.

Since the chief aim of advanced instruction is to familiarize students with the processes of critical analysis, the particular topics investigated during any semester are relatively unimportant. In view, however, of the fact that the most advanced degree conferred by the University calls for three years of study, it seems necessary that the special topics should be changed each year for a series of three years. As a result of this arrangement candidates for a bachelor's degree (who are adequately prepared) are provided with one year, candidates for a master's degree with two years, and candidates for a doctor's degree with three years of

specialized instruction. It will be noticed from the analysis given below that the topics covered in this specialized course have been somewhat cursorily treated in the "intermediate" or general University courses.

Professor ADAMS:—

[Development and Significance of English Political Economy.

*Three hours a week, for six weeks, first semester. This course is omitted in 1898-99.]*

[Comparative Study of Fiscal Institutions.

*Three hours a week, for six weeks, second semester. This course is omitted in 1898-99.]*

Development and Significance of the Historical School of Economics.

*Three hours a week, for six weeks, first semester.*

Labor Organizations and Corporations as Factors in Industrial Organization.

*Three hours a week, for six weeks, second semester.*

[Development and Significance of the Austrian School of Economy.

*Three hours a week, for six weeks, first semester. This course is omitted in 1898-99.]*

[Relation of the State to Industrial Action.

*Three hours a week, for six weeks, second semester. This course is omitted in 1898-99.]*

Professor F. M. TAYLOR:—

[The Value of Money.

Theory and statistics.—*Three hours a week, for six weeks, first semester. This course is omitted in 1898-99.]*

Social Philosophy, with Especial Reference to Economic Problems.

*Three hours a week, for six weeks, second semester.*

[The Agricultural Problem.

Treated from the comparative point of view. *Three hours a week, for six weeks, second semester. This course is omitted in 1898-99.]*

## [Paper Money.

Government *versus* bank notes. Methods of regulation.—*Ten lectures, first semester.* This course is omitted in 1898-99.]

## The Standard of Value.

Different schemes historically and critically examined.—*Ten lectures, first semester.*

## [Credit as a Factor in Production.

The modern institutions of credit historically and theoretically considered.—*Three hours a week, for six weeks, second semester.* This course is omitted in 1898-99.]

Dr. COOLEY:—

## The Principles of Association.

*Three hours a week, for six weeks, first semester.* This course will be omitted in 1899-1901.

## Competition.

*Three hours a week, for six weeks, second semester.* This course will be omitted in 1898-1901.

## [The Laws of Population.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1898-99, but may be expected in 1899-1900.]

## [Current Changes in the Social Organization of the United States.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1898-99, but may be expected in 1899-1900.]

## [Historical Development of Sociological Thought.

*Three hours a week, for six weeks, first semester.* This course is omitted in 1898-99, but may be expected in 1900-01.]

## [Social Psychology.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1898-99, but may be expected in 1900-01.]

**INTERNATIONAL LAW.**

The courses in international law presuppose a general acquaintance with modern European history.

President ANGELL:—

Lectures on International Law.

*Two hours a week, first semester.*

History of Treaties.

*Two hours a week, second semester.*

### MUSIC.

Courses are given in the University, but not here enumerated, that provide instruction in the science and practice of choral music, the science of harmony, and simple and double counterpoint. The courses named below are intended for graduate students.

Professor STANLEY:—

Canon and Fugue.

*Two hours a week, throughout the year.*

Musical Form.

*Two hours a week, throughout the year.*

Free Composition.

*Two hours a week, throughout the year.*

Instrumentation.

*Two hours a week, throughout the year.*

Original work in research will be required of candidates for a doctor's degree, who take music as one of their subjects.

### MATHEMATICS.

The courses mentioned below presuppose the usual preparatory course in algebra and elementary geometry, plane, solid, and spherical, together with two years of collegiate study devoted to trigonometry, higher algebra, plane analytic geometry, and differential and integral calculus.

In addition to the courses announced below, advanced work in mathematical reading and research will be arranged, so far as possible, to suit the needs of individual students.

#### A. FOR UNDERGRADUATES AND GRADUATES.

Professor BEMAN:—

Solid Analytic Geometry.

. Frost, with references to Salmon.—*Two hours a week, first semester*

**Differential Equations.**

Johnson, with references to Forsyth, Boole, and Mansion.—*Three hours a week, first semester.*

**Teachers' Seminary.**

Critical study of certain text-books in algebra and geometry, together with the discussion of methods and aims in mathematical teaching, sketches of the history of mathematics, lists of books for teachers, etc.—*Two hours a week, throughout the year.*

**Professor ZIWET.****Advanced Mechanics (I).**

This course forms a direct continuation of the course in elementary mechanics; it is mainly devoted to the dynamics of a rigid body.—*Three hours a week, second semester.*

**Assistant Professor MARKLEY:—****Projective Geometry.**

*Three hours a week, throughout the year.*

**Dr. GLOVER:—****Higher Algebra.**

The more important topics to be considered in this course are: symmetric functions of the roots; resultants; solution of a system of  $n$  linear equations; theorems concerning integral functions of one and two variables; correspondence; linear transformation; invariants and covariants; symbolic forms.—*Three hours a week, throughout the year.*

**B. PRIMARILY FOR GRADUATES.****Professor BEMAN:—****Advanced Differential and Integral Calculus.**

Jordan's Cours d'Analyse.—*Two hours a week, throughout the year.*

**Higher Plane Curves.**

Salmon, with references to Clebsch.—*Two hours a week, second semester.*

**Linear Differential Equations.**

*Two hours a week, second semester.*

**Professor ZIWET:—****Advanced Mechanics (II).**

This course forms an introduction to mathematical physics; it is devoted to the theory of the potential and some of its applications to hydrodynamics, electricity, etc.—*Two hours a week, first semester.*

### Partial Differential Equations.

This course, which presupposes an elementary knowledge of ordinary differential equations and projective geometry, will be devoted mainly to partial differential equations of the first order and their application to geometry and mathematical physics.—*Two hours a week, throughout the year.*

Assisant Professor MARKLEY:—

### Theory of Functions.

*Three hours a week, throughout the year.*

### Theory of Numbers.

*Two hours a week, throughout the year.*

Dr. GLOVER:—

### Theory of Substitutions.

The first half of this course will be devoted to the development of the elementary notions of groups, and, in particular, to the properties of substitution groups. The second half will take up the application of the latter to the algebraic equation.—*Two hours a week, throughout the year.*

### Theory of Invariants.

An introduction to the symbolic theory of invariants as developed by Aronhold, Clebsch, and Gordan.—*Two hours a week, throughout the year.*

### PHYSICS.

The courses here announced presuppose about one and a half years' collegiate work in physics; viz., a course in mechanics, sound, light, electricity, magnetism, and heat, five hours a week, for one year; a beginners' course in laboratory work, two or three hours a week for half a year; and a course in primary and secondary batteries, two hours a week for half a year.

The courses in Mathematical Electricity, the Theory of Light, and the Theory of Heat, and the Advanced Laboratory Courses in Sound and Light, are primarily for graduates; the other courses are open to undergraduates, but they are found to be beyond the work done in many colleges.

Graduate students, who are properly qualified by their previous training, have opportunity for original research in the physical laboratory under the immediate supervision of the director and his associates.

Professor PATTERSON has leave of absence for 1898-99. Dr. ——— will take his place.

Professor CARHART:—

Dynamo Electric Machinery.

*Three hours a week, second semester.*

Alternate Current Apparatus.

*Two hours a week, first semester.*

Alternate Current Phenomena: Steinmetz.

*Two hours a week, second semester.*

The Theory of Heat: Preston.

*Two hours a week, first semester.*

Dr. GUTHE and Dr. ———:—

Electrical Measurements.

Lectures, *one hour a week, throughout the year*; laboratory work, *three times a week, first semester*; *twice a week, second semester.*

Dr. ———:—

Mathematical Electricity.

*Three hours a week, first semester*; *two hours a week, second semester.*

Dr. GUTHE:—

Chemical Physics and Electro-Chemistry.

Theories of solution and electrolytes, including the osmotic theory of the voltaic cell. Lectures and laboratory work.—*Three times a week, second semester.*

Assistant Professor REED:—

The Theory of Light: Preston.

Lectures and recitations, *two hours a week*; laboratory work, *twice a week, second semester.*

Advanced Laboratory Work in Sound.

*Twice a week, first semester.*

Advanced Laboratory Work in Light.

*Twice a week, second semester.*



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**GENERAL CHEMISTRY.**

To be received as a candidate for a higher degree with chemistry as a major subject, the preparation must include the branches of general, analytical, and organic chemistry. The extent of work in these branches must have been equivalent in substance to the following named undergraduate courses in this University (University Calendar for 1897-98, pages 86 to 90): Course 2 or 5 in general chemistry, and Courses 1 or 3a, 4, and 10 in analytical and organic chemistry,—making in all about twenty-seven hours of undergraduate credit.\* If chemistry be taken as a minor subject in work registered for a higher degree, preparation must have been made in general chemistry, equivalent at least to undergraduate Courses 1, 2, and 5 in this University.

Candidates for a doctor's degree, in addition to the requirements above specified, must have satisfied the committee in charge of their studies as to their fitness to enter upon the higher work. A reading knowledge of German and French is necessary.

Graduate students who are not in work for a degree, and those who are preparing for registration as candidates for higher degrees according to the requirements above stated, will be directed in such chemical studies as they require.

A very complete chemical library, with the full sets of the journals in demand for research, and with current literature in all branches of chemistry, is provided in the University General Library. A reading-room in the Chemical Laboratory furnishes duplicates of the full sets most used, as well as duplicates of the chief compilations.

**Professor FREER:—****Historical Chemistry.**

Lectures and historical readings.—*Two hours a week, first semester.*

**Chemical Literature; Journal Club.**

The Journal Club discusses current chemical literature. It is under the direction of Professor FREER, but all the instructors and assistants in the department of general chemistry take part therein.—*One hour to one and one-half hours a week, throughout the year.*

**Laboratory Research.**

The work may be either organic or inorganic.—*Hours arranged with instructor, throughout the year.*

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\*An "hour of credit" implies the satisfactory completion of work equivalent to one exercise a week during one semester.

Mr. HIGLEY:—

Laboratory Work in Selected Topics of Inorganic Chemistry.

*Hours arranged with instructor.*

Laboratory Research in Inorganic Chemistry.

*Hours arranged with instructor.*

Mr. LICHTY:—

Laboratory work with the Polariscope and the Spectroscope.

*Hours arranged with instructor, second semester.*

Laboratory research.

Inorganic Chemistry.—*Hours arranged with instructor.*

Dr. SHERMAN:—

Laboratory work in Organic Preparations.

*Hours arranged with instructor.*

Laboratory Research.

Organic or Inorganic Chemistry.—*Hours arranged with instructor.*

Dr. BIGELOW:—

Physical Chemistry.

Lectures.—*Two hours a week, first semester.*

Laboratory work in Physical Chemistry.

*Hours arranged with instructor.*

Laboratory Research.

Physical Chemistry.—*Hours arranged with instructor.*

#### **ORGANIC CHEMISTRY AND ANALYTICAL CHEMISTRY.**

As to requirements for graduate studies, facilities, etc., see under General Chemistry, page 41.

Professor PRESCOTT, Dr. GOMBERG, and Mr. TROWBRIDGE:—

Organic Synthesis and Ultimate Analysis.

Open to those who are prepared in general chemistry, qualitative and quantitative analysis, the lecture course in organic chemistry, and

the initial organic preparations. Laboratory work with reading by subjects in the library.—*Hours arranged with the several instructors, throughout the year.*

### Chosen Subjects in Organic Chemistry.

Open to those who have had a primary lecture course and a course of laboratory work in organic chemistry.—*Lectures* (by Dr. GOMBERG), *twice a week, first semester.*

### The Benzene Derivatives.

Open to those who have had a primary lecture course and a course of laboratory work in organic chemistry.—*Lectures* (by Dr. GOMBERG), *four times a week, second semester.*

### Analytical Organic Chemistry.

Open to those who have had undergraduate Course 14, or its equivalent. Courses of analytical study on Alkaloids (Dr. GOMBERG), on Fats (Mr. TROWBRIDGE), on Beet Sugar (Mr. TROWBRIDGE), and on Foods (Professor PRESCOTT).—*Hours arranged with the several instructors, throughout the year.*

### Investigation in Organic Chemistry.

Open to those found to be prepared. Laboratory and library work, as assigned upon consultation.—*Hours arranged with the several instructors, throughout the year.*

## Professor JOHNSON:—

### Qualitative Analytical Chemistry.

The applicant must be able to pass examination in Courses 1 and 4 of the undergraduate studies or their equivalent. A study of qualitative methods and inorganic reactions.—*Lectures, two hours a week; laboratory work at hours arranged with instructor, second semester.*

### Investigation in Inorganic Reactions.

Open to those who have completed the last named course, or, being prepared for that course, have also a preparation for the desired research. Laboratory work and search of the authorities in the library.—*Hours arranged with instructor, throughout the year.*

## Professor CAMPBELL and Mr. WHITE:—

### Quantitative Analytical Chemistry.

Open to those who have had Course 4 of undergraduate studies, or its equivalent, and the chemical work required to precede it. Laboratory work in advanced quantitative analysis, with specialization in

some direction suitable for the student.—*Hours arranged with instructors, throughout the year.*

### Chemical Technology.

Lectures on Organic Chemical Technology, following undergraduate Course 32 in inorganic technology (Mr. WHITE).—*Five times a week, second semester.*

### Investigations in Analytic Method, Inorganic Structure, and Metallurgical Chemistry.

Open to those who have taken the work last named, or have had equal training, applicable to the research undertaken. Work with gases may be included, also micro-metallography.—*Hours arranged with instructors, throughout the year.*

### **HYGIENE AND PHYSIOLOGICAL CHEMISTRY.**

The courses here announced presuppose that the student taking them is prepared for original research.

Professor VAUGHAN:—

#### Original Research on the Causation of Disease.

*Hours arranged with instructor, either first or second semester.*

Professor NOVY:—

#### Advanced Physiological Chemistry.

Laboratory work and reading.—*Hours arranged with instructor, either first or second semester.*

#### Special Methods in Bacteriology.

This course must be preceded by Courses 2 and 3, described in the University Calendar for 1897-98, page 92.—*Hours arranged with instructor, either first or second semester.*

#### Methods of Hygiene.

Chemical and bacteriological examination of water, air, soil, milk, butter, etc.—*Hours arranged with instructor, either first or second semester.*

### **ASTRONOMY.**

The courses here announced presuppose acquaintance with general astronomy and calculus.

Professor HALL:—

#### Theory and Computation of Orbits.

*Five hours a week, first semester.*

**Mathematical Theory of Planetary Motion.***Three hours a week, second semester.***Theory of Least Squares.***Two hours a week, second semester.***Professor HALL and Dr. TOWNLEY:—****Practical Work.***Hours arranged with instructors, throughout the year.***Spherical Astronomy.***Three hours a week, throughout the year.***Dr. TOWNLEY:—****Theory and Computation of Special Perturbations.***Three hours a week, second semester.***MINERALOGY.**

The higher work in mineralogy presupposes an elementary knowledge of chemistry and an introductory course in mineralogy, combining theoretical instruction with practice in determining minerals. The work will be directed by Professor PETTEE.

**GEOLOGY.**

The course of instruction in geology for undergraduates, as announced in the University Calendar for 1897-98, pages 94 and 95, embraces from two to three years of University work. The first year is devoted to elementary studies in physical geology, historical geology, and physical geography, giving three hours a week to each for one semester. Le Conte's Elements of Geology and Dana's Manual of Geology are used, supplemented by lectures and exhibitions of specimens, maps, etc. During the second year more detailed instruction is given, two hours each week, in the same general subjects. Green's Physical Geology is used for reference during the first semester, supplemented by lectures and laboratory work. Each student is given a special subject for investigation in connection with which a thesis of about 2500 words is required. During the second semester palæontological studies are carried on with the aid of various treatises and laboratory work. A special subject is assigned each student and a short thesis is required.

Students in the graduate school may enter either of the advanced courses mentioned above, providing studies equivalent to the elementary courses have been pursued. Those who have done more work than is represented by the elementary course may make special arrangements for instruction and assistance in various lines of study, dependent on their

tastes and acquirements. In a general course the current literature of geology will be read with special reference to Pleistocene geology, and to the origin and classification of topographic forms, glacial records, lake histories, erosion, and all of the processes by which the surface of the earth has come to have its present form.

The geological museum is being rearranged and a series of fossils selected to illustrate the life history of North America. This collection is intended especially for the use of students in the elementary courses, but may be consulted by advanced students as well. The specimens will be exhibited in the lecture room as required, and after lectures will be returned to the cases in the museum where they will be available for examination at any time.

There is a second collection embracing some ten thousand specimens of both American and European fossils, which is arranged zoologically and intended for the use of advanced students in palæontology. Special collections of rocks, brachiopods, corals, etc., numbering from one hundred and fifty to two hundred specimens each are arranged in the geological laboratory for the immediate use of students.

The collection in physical geology is small, but efforts are being made for its enlargement, and ample material will be on hand to illustrate lectures in this department. Students bringing private collections will be given an opportunity to arrange them in cases provided for the purpose, and facilities for consulting original monographs, and making comparison with specimens in the museum.

The geological laboratory is provided with apparatus for preparing thin sections of fossils and rocks, and with microscopes and photographic instruments. The laboratory is open to students from nine until five each day throughout the collegiate year.

The work in geology will be conducted by, or under the direction of, Professor RUSSELL.

#### **ZOOLOGY.**

The courses here announced presuppose a year's work in general biology, such as is carried on in this University conjointly by the departments of botany and zoology. Following the general biology, work is provided in both invertebrate and vertebrate zoology. Candidates for the higher degrees will usually pursue both lines of work, but will find it of advantage to specialize in one of them; they will also be required to have a knowledge of the elements of physics and chemistry and some acquaintance with French and German.

In the laboratory, a description of which is given in the University Calendar for 1897-98, page 31, the student learns methods of dissection, staining, imbedding, section-cutting, graphic and solid reconstruction, experimentation, and other technical methods of investigation. A library

shelved in the laboratory, contains sets of the important English and foreign periodicals, as well as many monographs, and other separate publications. It contains also an extensive collection of original papers relating to the invertebrate fauna of fresh waters. The private collections of the instructors and the library of the Department of Medicine and Surgery, which is rich in the literature of vertebrates, are also accessible to students. The original papers in connection with both lectures and laboratory work are placed in the hands of students, and special reading is required.

Graduate students will often find the elementary work in general biology of value to them, and they can rarely omit, without loss, any of the courses in zoology that are open to undergraduates.

A student who selects zoology as a *minor* for the *master's degree* may pursue the course in invertebrate morphology, vertebrate comparative anatomy, vertebrate embryology, or histology, but is not required to do work in more than one of these subjects. If zoology be chosen as a *major*, work may be taken in invertebrate morphology and at the same time in any two of the branches of vertebrate morphology named above. For any of the branches the student may substitute research work, and such substitution is advised for those who do not intend to become candidates for the doctor's degree.

The work outlined for those who elect zoology as a major for the master's degree is suitable for candidates for the *doctor's degree* who elect this subject as a *minor*.

Those electing zoology as a *major* for the *doctor's degree* are expected to complete all the courses offered. During the first part of his term of residence at the University, the candidate should devote his time to these courses and to the completion of work on the minors. In his second year of residence, in addition to completing the work mentioned, he is expected to repeat a designated piece of research work in order to acquaint himself with methods of investigation. At the same time he does assigned reading on the more important problems of zoology and on zoological history and theory. At the least one year must be devoted to the research, which is to be embodied in the doctor's dissertation.

Those electing zoology as a major, will find it of advantage to select as one minor either botany, physiology, systematic zoology, palæontology, or physiological psychology. Less closely related is work in bacteriology, physiological and organic chemistry, and geology.

#### A. PRIMARILY FOR GRADUATES.

Professor REIGHARD:—

#### Current Literature of Zoology.

The instructors and advanced students hold weekly meetings. at

which reports are made on important current papers, followed by informal discussion. Although the meetings are open to all, the membership is restricted.—*One hour a week, throughout the year.*

Research work in zoology, invertebrate morphology, and vertebrate comparative anatomy, embryology, and histology.

Definite problems are assigned and worked out under the constant supervision of the instructor. The locality affords exceptional advantages for work on vertebrate embryology (Petromyzon, several Teleosts, Amia, Acipenser, Amblystoma, and other forms are under control) and for faunistic or experimental studies on invertebrates. Students intending to begin this work should confer with the professor in charge as early as the preceding spring in order that they may have time in which to prepare necessary material.—*Hours arranged with instructors, throughout the year.*

Assistant Professor HUBER:—

Microscopic Anatomy of the Brain and Special Sense Organs.

This course presupposes a knowledge of mammalian (or human) anatomy, including dissection. It must be preceded or accompanied by a course in microscopic technique. Work in vertebrate embryology, though not indispensable, is advised.—*Five hours a week, first or second semester.*

#### B. FOR GRADUATES AND UNDERGRADUATES.

Professor REIGHARD:—

The Comparative Embryology and Anatomy of Vertebrates.

The work in embryology, which precedes the anatomy, begins with a study of the early stages of fishes and amphibia and concludes with detailed work on the chick. In anatomy a few type forms are dissected and preparations of other forms are studied. The lectures are illustrated by charts and preparations especially designed for the purposes of this course.—*Six hours a week, throughout the year.*

This work may be advantageously preceded by the undergraduate courses in mammalian anatomy and histology (Courses 5, 6, and 7, University Calendar for 1897-8, pages 98-100) though these courses are not required.



Assistant Professor HUBER:—

### Vertebrate Histology.

Lectures and laboratory work with instruction in methods.—*Five hours a week, first or second semester.*

### Methods of Vertebrate Histology.

Laboratory work with reading.—*Two hours a week, second semester.*

Dr. LILLIE:—

### Invertebrate Morphology.

The lectures treat of the comparative anatomy and ontogeny of invertebrates. The laboratory work and demonstrations include a series of forms which supplement that studied in the course in general biology.—*Five hours a week, first semester.*

### Experimental Morphology.

The lectures review recent experimental work in embryology and show the bearing of the results on theories of heredity. The internal and external factors of development will be treated in alternate years. *One hour a week, second semester.*

By special arrangement this course may be extended to *three hours a week*, and will then include laboratory work. A similar laboratory course is available in the first semester. A laboratory has been fitted up especially for this work.

Mr. JOHNSTON:—

### Mammalian Anatomy.

Dissection of the cat, with class-meetings twice a week for quizzes on the anatomy of the cat and for such lectures as may be necessary. It is the purpose of the course to afford a training in mammalian anatomy which shall be substantially equivalent to the training which the medical student receives in human anatomy. This training gives that mastery of anatomical facts and that knowledge of anatomical technique, which are believed to furnish the most satisfactory basis for the study of human or comparative anatomy. The class makes use of type-written copies of a descriptive anatomy of the cat prepared by Professor REIGHARD.—*Six times a week, second semester.*

### Museum Work.

Students desiring to carry on systematic work on special groups represented in the University Museum, will be given every opportunity to do so, but must first satisfy the instructor in charge of their fitness to pursue the work.—*Either first or second semester.*

### Field Club.

This is a voluntary organization of zoological students for the purpose of collecting, identifying, studying, and preserving specimens of the local fauna. Occasional meetings are held for lectures and for other purposes. Members of the zoological staff are members of the club and take part in its work.—*Second semester.*

### BOTANY.

#### A. PRIMARILY FOR GRADUATES.

Professor SPALDING and Assistant Professor NEWCOMBE:—

Investigations in Morphology and Physiology.

*Throughout the year.*

#### B. FOR GRADUATES AND UNDERGRADUATES.

The equivalent of a full year in the study of botany is required for admission to any of the courses named below, all of which consist largely of laboratory work.

Professor SPALDING:—

Morphology and Physiology of Fungi.

Lectures and laboratory work.—*Five hours a week, first semester.*

Plant Morphology.

Aside from the laboratory work, there will be lectures and reading directed toward the principles of relationship and classification.—*Three, or five, hours a week, second semester.*

Current Literature of Botany.

Important papers on botany are reviewed and discussed.—*One hour a week, throughout the year.*

Assistant Professor NEWCOMBE:—

Cell Morphology and Physiology.

The application of finer methods to biological research; cell structure, organization, and activity; mitosis; heredity; the cell theory. Lectures and laboratory work.—*Five hours a week, first semester.*

Experimental Physiology of Plants.

A laboratory study of the relations of plants to their environment, as manifested by the phenomena of nutrition, growth, and irritability. The work in the first semester will deal with special problems, and, in the second semester, with general physiology.—*Five hours a week, throughout the year.*

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**PHYSIOLOGY.**

The advanced work in physiology presupposes a knowledge of anatomy, including histology, and the elements of physics and chemistry. The required training is to be got from such courses as 1 and 2 in general biology, 5, 6, and 7 in zoology (or, in place of Course 5, courses in descriptive human anatomy and practical anatomy), 1, 2, and 3a in physics, 5 in general chemistry, and 28 in organic chemistry (described in the University Calendar for 1897-98, pages 84 to 100). Ability to read German is indispensable, and French is desirable, for students taking physiology as a major study for an advanced degree, though in some cases a candidate may be considered qualified to begin his advanced work prior to the completion of these requirements.

**Professor LOMBARD:—**

**Lectures and Recitations.**

*Five hours a week, throughout the year.*

**Laboratory Course.**

*Three hours a week, one-third of a semester.*

**Physiological Experimentation.**

*One hour a week, one semester.*

**Physiological Research and Collateral Reading.**

Arranged to meet the wants of students who take physiology as a major study.

# Catalogue of Students, 1897-98.\*

## RESIDENT GRADUATES.

| NAME.                                                                                                                              | RESIDENCE.               |
|------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Inez Louise Abbott, A.B., 1895,<br>Latin; Greek; Roman Political Antiquities.                                                      | <i>Holt.</i>             |
| Romanzo Colfax Adams, Ph.B., 1897,<br>Political Economy; American History; American Literature.                                    | <i>Bloomington, Wis.</i> |
| Frederick Alexander, A.B., 1894,<br>Rhetoric; American Literature; Aesthetics.                                                     | <i>Detroit.</i>          |
| Mary Emma Armstrong, A.B., <i>Olivet Coll.</i> , 1894,<br>Latin; Greek; Roman Political Antiquities.                               | <i>Lapeer.</i>           |
| Martin Darrelle Atkins, A.B., 1886,<br>Physics; Organic Chemistry; Mathematics.                                                    | <i>Lake Forest, Ill.</i> |
| Annie Louise Bacorn, B.L., 1896,<br>Rhetoric; English Literature; Philosophy.                                                      | <i>Ann Arbor.</i>        |
| Ella Bourne, Ph.B., <i>DePauw University</i> , 1893,<br>Ph.M., 1897,<br>Latin; German; Ancient Ethics.                             | <i>Ann Arbor.</i>        |
| Edgar Ewing Brandon, A.B., 1888, A.M., <i>University of the State of Missouri</i> , 1897,<br>French; Italian; General Linguistics. | <i>Ann Arbor.</i>        |
| Clifton Henry Briggs, B.S., <i>Mich. Agr. Coll.</i> , 1896,<br>General Chemistry; Physics; Analytical Chemistry.                   | <i>Lacey.</i>            |
| Herman Elisha Brown, B.S., 1896,<br>Organic Chemistry; Qualitative Chemistry; Metaphysics.                                         | <i>Kinderhook.</i>       |
| William Morgan Case Bryan, A.B., <i>Washington University</i> , 1897,<br>Botany; Physics; Chemistry.                               | <i>Saint Louis, Mo.</i>  |

\* The principal subjects of study pursued by candidates for an advanced degree are indicated under their respective names.

An asterisk (\*) before a student's name indicates that the student is also pursuing studies in the Department of Medicine and Surgery or in the Department of Law.

A dagger (†) indicates that the student was admitted to the Graduate School at the beginning of the second semester, on completion of the requirements for the bachelor's degree indicated in each case, though the degree was not to be conferred until the end of the year.

- Juliet Morton Butler, B.S., 1897, *Ann Arbor.*  
Vertebrate Zoology; Invertebrate Zoology; Vegetable Physiology.
- Archibald Campbell, Ph.B., 1896, *Manhattan, Ill.*  
Organic Chemistry; General Chemistry; Geology.
- Elizabeth Alma Campbell, Ph.B., 1891, *Ann Arbor.*  
German; French Literature; Rhetoric.
- Lewis Clinton Carson, A.B., 1892, A.B., *Harvard University*, 1893, *Detroit.*  
History of Philosophy; Philosophy of Religion; German.
- Dick R. Clippinger, A.B., *Kenyon College*, 1895, *Gambier, O.*  
Physiology; Hygiene; General Biology.
- Allen Lysander Colton, Ph.B., 1889, A.B., 1890, *Mount Hamilton, Cal.*  
Astronomical Photography; Physics; Practical Astronomy.
- Thomas Benton Cooley, A.B., 1891, M.D., 1895, *Ann Arbor.*  
Physiological Chemistry; General Chemistry; Bacteriology.
- †Albertus Darnell, Ph.B., 1898, *Hinckley, Ill.*  
Mathematics; English Literature; Political Economy.
- \*Arnold Lyman Davis, A.B., *University of South Dakota*, 1895, *Watertown, S. Dak.*  
Sociology; Political Economy; Jurisprudence.
- \*William Bellows Decker, A.B., 1896, *Ann Arbor.*  
Bacteriology; Physiology; Hygiene.
- John Dieterle, *Eden College*, 1887, *Ann Arbor.*  
German Literature; Germanic Philology; Ethics.
- Grant Henry Dunning, B.S., 1893, *Howell.*
- John Robert Effinger, Jr., Ph.B., 1891, Ph.M., 1894, *Ann Arbor.*  
French Literature; Italian Literature; History.
- Mary Louise Engelhard, B.L., 1897, *Ann Arbor.*  
German Literature; Germanic Philology; French.
- Homer Redfield Foster, Ph.B., 1897, *Benton Harbor.*  
Botany; Vegetable Physiology; Zoology.
- Oliver D. Frederick, B.S., *West Chester Normal School*, 1895, *North Wales, Pa.*  
Mathematics; Physics; Pedagogy.
- †Eliza Ellen Fyan, A.B., 1898, *Port Huron.*  
Latin; English; American History.
- †Grace Fanny Goodman, Ph.B., 1898, *Kansas City, Mo.*  
American History; Political Economy; History.
- Frederic Samuel Goodrich, A.B., *Wesleyan University*, 1890, *Albion.*  
Greek; Hellenistic Greek; Archæology.
- Herbert Jay Goulding, B.S., 1893, *Ann Arbor.*  
Mathematics; Mechanics; Projective Geometry.

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| Charles Henry Gray, B.L., 1895, M.L., 1896,<br>English Literature; Rhetoric; Pedagogy.                                       | <i>Ann Arbor.</i>        |
| Arthur Graham Hall, B.S., 1887,<br>Mathematics; Physics; Mechanics.                                                          | <i>Ann Arbor.</i>        |
| Florence Mabelle Halleck, Ph.B., 1896,<br>American History; English History; French Literature.                              | <i>Ann Arbor.</i>        |
| Sophie Chantal Hart, A.B., <i>Radcliffe College</i> , 1892, <i>Boston, Mass.</i><br>Rhetoric; English Literature; Æsthetics. |                          |
| William Henry Hawkes, A.B., 1887,<br>Physics; Mathematics; Chemistry.                                                        | <i>Ann Arbor.</i>        |
| George Frederick Heffelbower, A.B., 1897,<br>Latin; Greek; History.                                                          | <i>Ann Arbor.</i>        |
| Annie Louise Hill, A.B., 1897,<br>Latin; Greek; English Literature.                                                          | <i>Detroit.</i>          |
| Mary Louisa Hinsdale, A.B., <i>Adelbert College</i> ,<br>1885, A.M., 1890,<br>Pedagogy; Political Economy; American History. | <i>Ann Arbor.</i>        |
| DeWitt Clinton Huntoon, B.L., 1897,<br>Organic Chemistry; Analytical Chemistry; Pedagogy.                                    | <i>Waterford.</i>        |
| Lambert Lincoln Jackson, A.B., 1897,<br>Mathematics; Mechanics; Pedagogy.                                                    | <i>Ypsilanti.</i>        |
| Samuel Allen Jeffers, A.B., <i>Central Wesleyan</i><br><i>College</i> , 1892, A.M., 1897,<br>Latin; Greek; Ancient Ethics.   | <i>New Florence, Mo.</i> |
| John Black Johnston, Ph.B., 1893,<br>Zoology; Physiological Psychology; Physiology.                                          | <i>Ann Arbor.</i>        |
| Florence Bingham Kinne, A.B., 1887,<br>American Literature; Psychology; German.                                              | <i>Ypsilanti.</i>        |
| Riotaro Kodama, <i>Doshisha College</i> ,<br>Political Economy; Finance; History.                                            | <i>Wakayama, Japan.</i>  |
| Grace Lord Lamb, B.L., 1897,<br>History of Philosophy; History; English Literature.                                          | <i>Erie, Pa.</i>         |
| Eugene LaRowe, A.B., 1896,<br>Latin; Greek; English Literature.                                                              | <i>Webberville.</i>      |
| Herman Adolf Liebig, A.B., 1895,<br>German; Philosophy; English.                                                             | <i>Ann Arbor.</i>        |
| John Hancock McClellan, A.B., 1897,<br>Vertebrate Zoology; Experimental Morphology; Physiology.                              | <i>Lexington, Ky.</i>    |
| William Marshall, B.S., 1897,<br>Mathematics; Mechanics; Physics.                                                            | <i>Ypsilanti.</i>        |
| *Stanley M. Matthews, B.L., 1897,<br>American History; Political Economy; Rhetoric.                                          | <i>Escanaba.</i>         |

- Paul Ingold Murrill, B.S., *Kentucky State College*,  
1895, M.S., *ibid.*, 1896, *Detroit*.  
Organic Chemistry; General Chemistry; Bacteriology.
- Bert William Peet, B.S., *Mich. Agr. Coll.*, 1892, *Chesaning*.  
General Chemistry; Theoretical Chemistry; Mineralogy.
- Jessie Phelps, B.S., 1894, *Pontiac*.  
Vertebrate Zoology; Invertebrate Zoology; Botany.
- †Grace Trowbridge Potter, A.B., 1898, *Detroit*.  
Latin; Greek; Roman Political Antiquities.
- Ernest Ethan Race, A.B., *Colgate University*,  
1891, A.M., *ibid.*, 1893, *Greene, N. Y.*  
Botany; Zoology; Chemistry.
- Edwin Carl Roedder, A.B., 1893, A.M., 1894, *Ann Arbor*.  
German; Old English; General Linguistics.
- May Cecil Ryan, A.B., 1895, *Ann Arbor*.  
Latin; Greek; Roman Political Antiquities.
- Louis Dow Scisco, B.S., *Cornell University*, 1888, *Ann Arbor*.
- Hudson Sheldon, A.B., 1891, *Corunna*.  
General Chemistry; Physics; Mathematics.
- Katharyne Griffith Sleneau, A.B., 1897, *Ann Arbor*.  
Rhetoric; English Literature; Æsthetics.
- †Archibald Whittier Smalley, A.B., 1898, *Chicago, Ill.*  
Latin; Greek; Political Economy.
- †Jeannette Smith, B.L., 1898, *Cheboygan*.  
German; French; English.
- Mary Duty Spencer, A.B., *Vassar College*, 1896, *Detroit*.  
American History; Latin; Rhetoric.
- Duane Reed Stuart, A.B., 1896, *Holder of the Eli-  
sha Jones Classical Fellowship*, *Detroit*.  
Greek; Latin; Classical Archæology.
- James Wellings Sturgis, A.B., 1896, A.M., 1897, *Ithaca*.  
Latin; Greek; Philosophy.
- Gertrude Mary Sudworth, A.B., 1885, *Ann Arbor*.
- Edson Read Sunderland, A.B., 1897, *Ann Arbor*.  
Modern Philosophy; American Constitutional History; Comparative Constitutional  
Law.
- Ruby Winifred Sunderlin, A.B., *Olivet College*,  
1897, *Lansing*.  
Latin; Greek; Roman Political Antiquities.
- Frederick Tyndall Swan, A.B., 1897, *Potsdam, N. Y.*  
Latin; Greek; English Literature.

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| Earle Reed Swift, B.S., <i>Olivet College</i> , 1897,                                                     | <i>Olivet.</i>          |
| Hamilton Greenwood Timberlake, A.B., <i>Lake Forest University</i> , 1897,                                | <i>LaGrange, Ill.</i>   |
| Botany; Vegetable Physiology; Zoology.                                                                    |                         |
| Itsuo Tokunaga, <i>Doshisha College</i> ,                                                                 | <i>Yanagawa, Japan.</i> |
| Political Economy; Finance; History.                                                                      |                         |
| Charles Edwin Van Orstrand, B.S. [C.E.], <i>University of Illinois</i> , 1896, B.S., <i>ibid.</i> , 1897, | <i>Pekin, Ill.</i>      |
| Theoretical Astronomy; Practical Astronomy; Mechanics.                                                    |                         |
| †Matthew John Walsh, A.B., 1898,                                                                          | <i>Grand Rapids.</i>    |
| Latin; Greek; Pedagogy.                                                                                   |                         |
| Hugh Elmer Ward, B.S., <i>Mich. Agr. Coll.</i> , 1895,                                                    | <i>Ada.</i>             |
| Bacteriology; Physiology; Organic Chemistry.                                                              |                         |
| Arletta Leora Warren, Ph.B., <i>Univ. of Wooster</i> ,                                                    |                         |
| 1889,                                                                                                     | <i>Wooster, O.</i>      |
| Latin; Greek; Ancient Ethics.                                                                             |                         |
| Willis Hamel Wilcox, Ph.B., 1896,                                                                         | <i>Elva.</i>            |
| American Literature; American History; Pedagogy.                                                          |                         |
| Clarence George Wrentmore, B.S., 1893,                                                                    | <i>Ann Arbor.</i>       |
| Mathematics; Mechanics; Projective Geometry.                                                              |                         |
| Jeremiah Simeon Young, A.B., <i>Kansas College</i> ,                                                      |                         |
| 1890, A.M., <i>ibid.</i> , 1894,                                                                          | <i>Greeley, Col.</i>    |
| American History; Pedagogy; English Literature.                                                           |                         |

#### CANDIDATES FOR A MASTER'S DEGREE, STUDYING IN ABSENTIA.

| NAME.                                                         | RESIDENCE.              |
|---------------------------------------------------------------|-------------------------|
| Mary Sophia Case, A.B., 1884,                                 | <i>Wellesley, Mass.</i> |
| British Philosophy; Political Philosophy; English Literature. |                         |
| Walter Charles Haight, B.L., 1896,                            | <i>Marinette, Wis.</i>  |
| American History; Political Economy; European History.        |                         |



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UNIVERSITY OF MICHIGAN

DEPARTMENT OF LITERATURE, SCIENCE, AND THE ARTS

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# GRADUATE SCHOOL

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ANNOUNCEMENT

FOR

1899-1900

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ANN ARBOR, MICH.  
PUBLISHED BY THE UNIVERSITY  
1899



UNIVERSITY OF MICHIGAN

DEPARTMENT OF LITERATURE, SCIENCE, AND THE ARTS

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## CALENDAR.

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1899.

- Sept. 21-23. *Examination for Admission to the Department of Literature, Science, and the Arts.*
- Sept. 26. FIRST SEMESTER BEGINS IN ALL DEPARTMENTS OF THE UNIVERSITY.
- Nov. Thanksgiving recess of three days, beginning Tuesday evening, in all Departments of the University.
- Dec. 21. (Evening.) Holiday Vacation begins in all Departments.

1900.

- Jan. 9. Exercises resumed.
- Feb. 9. (Evening.) FIRST SEMESTER CLOSES.
- Feb. 12. SECOND SEMESTER BEGINS.
- April 13. (Evening.) Recess begins, ending April 23 (evening).
- June 21. COMMENCEMENT IN ALL DEPARTMENTS OF THE UNIVERSITY.

## ADMINISTRATIVE COUNCIL.

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JAMES B. ANGELL, LL.D., *President.*

ALBERT B. PRESCOTT, M.D., LL.D., *Director of the Chemical Laboratory, and Professor of Organic Chemistry.*

REV. MARTIN L. D'OUGE, LL.D., *Professor of the Greek Language and Literature.*

WILLIAM H. PETTEE, A.M., *Professor of Mineralogy, Economic Geology, and Mining Engineering.*

ISAAC N. DEMMON, LL.D., *Professor of English and Rhetoric.*

ALBERT H. PATTENGILL, A.M., *Professor of Greek.*

WOOSTER W. BEMAN, A.M., *Professor of Mathematics.*

VICTOR C. VAUGHAN, PH.D., SC.D., M.D., *Professor of Hygiene and Physiological Chemistry, and Director of the Hygienic Laboratory.*

CHARLES S. DENISON, M.S., C.E., *Professor of Descriptive Geometry, Stereotomy, and Drawing.*

\*HENRY S. CARHART, LL.D., *Professor of Physics, and Director of the Physical Laboratory.*

VOLNEY M. SPALDING, PH. D., *Professor of Botany.*

HENRY C. ADAMS, LL.D., *Professor of Political Economy and Finance.*

BURKE A. HINSDALE, LL.D., *Professor of the Science and the Art of Teaching.*

RICHARD HUDSON, A.M. *Professor of History, and Dean of the Department of Literature, Science, and the Arts.*

ALBERT A. STANLEY, A.M., *Professor of Music.*

FRANCIS W. KELSEY, PH.D., *Professor of the Latin Language and Literature.*

OTIS C. JOHNSON, PH.C., A.M., *Professor of Applied Chemistry.*

PAUL C. FREER, PH.D., M.D., *Professor of General Chemistry, and Director of the Laboratory of General Chemistry.*

ANDREW C. McLAUGHLIN, A.M., LL.B., *Professor of American History.*

ASAPH HALL, JR., PH.D., *Professor of Astronomy, and Director of the Observatory.*

ISRAEL C. RUSSELL, C.E., LL.D., *Professor of Geology.*

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\*Absent on leave for the year 1899-1900.

- WARREN P. LOMBARD, A.B., M.D., *Professor of Physiology.*  
JACOB E. REIGHARD, Ph.B., *Professor of Zoology, and Director of the Zoological Laboratory and the Zoological Museum.*  
THOMAS C. TRUEBLOOD, A.M., *Professor of Elocution and Oratory.*  
JAMES A. CRAIG, Ph.D., *Professor of Semitic Languages and Literatures and Hellenistic Greek.*  
JOHN C. ROLFE, Ph.D., *Professor of Latin.*  
J. PLAYFAIR McMURRICH, Ph.D., *Professor of Anatomy.*  
ROBERT M. WENLEY, Sc.D., D.Phil., *Professor of Philosophy.*  
ELIZA M. MOSHER, M.D., *Professor of Hygiene.*  
GEORGE A. HENCH, Ph.D., *Professor of Germanic Languages and Literatures.*  
GEORGE HEMPL, Ph.D., *Professor of English Philology and General Linguistics.*  
———, *Professor of Romance Languages and Literatures.*  
FREDERICK G. NOVY, Sc.D., M.D., *Junior Professor of Hygiene and Physiological Chemistry.*  
EDWARD D. CAMPBELL, B.S., *Junior Professor of Analytical Chemistry.*  
FRED M. TAYLOR, Ph.D., *Junior Professor of Political Economy and Finance.*  
FRED N. SCOTT, Ph.D., *Junior Professor of Rhetoric.*  
ALEXANDER ZIWET, C.E., *Junior Professor of Mathematics.*  
GEORGE W. PATTERSON, JR., A.M., S.B., *Junior Professor of Physics.*  
FREDERICK C. NEWCOMBE, Ph.D., *Junior Professor of Botany.*  
ALFRED H. LLOYD, Ph.D., *Assistant Professor of Philosophy.*  
CHARLES H. COOLEY, Ph.D., *Instructor in Sociology.*

# **ANNOUNCEMENT OF THE GRADUATE SCHOOL.**

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## **GENERAL INFORMATION.**

### **The University of Michigan.**

The University of Michigan is a part of the educational system of the State, and derives from the State, in one way or another, the greater part of its revenue. The University comprises the Department of Literature, Science, and the Arts, and six professional schools, each of which has its own Faculty and issues each year a separate departmental Announcement. In the several faculties there were in 1898-99 one hundred and forty-three officers of instruction besides numerous assistants, some of whom participated in the work of teaching. Including the Summer Schools, 3,192 students, representing forty-eight States and Territories, and ten foreign countries, were in attendance.

### **The Department of Literature, Science, and the Arts.**

In the Department of Literature, Science, and the Arts, the aim is to cover the broad field of general university study of the ancient and the modern languages and literatures, of history, philosophy, science, and the liberal arts, as distinguished from the more special work of the professional schools. Its Faculty numbered, in 1898-99, ninety-five regular teachers and thirteen assistants. The students in attendance numbered nearly thirteen hundred, of whom seventy-five were graduates. The presence of such a number of graduate students, taken with the fact that high specialization of work is not uncommon among undergraduates, tends to create a genuine university atmosphere, and to assure the advanced student of intellectual comradeship.

### **The Libraries.**

The various libraries of the University contain nearly 123,000 volumes, and include a number of important special collections. Among these are the McMillan Shakespeare Library, 4,642 volumes; the Parsons

Library (political science), 4,325 volumes; the Hagerman Collection (history and political science), 2,660 volumes, and the Goethe Library of 948 volumes. The general reading room seats two hundred and ten readers, and separate rooms are provided for advanced students to work in, with the necessary books close at hand. Under certain restrictions graduate students have access to the book rooms. The library takes seven hundred and forty periodicals, and is open, in term time, fourteen hours daily, except on Sundays and legal holidays. During the summer vacation it is open nine hours a day for the six weeks of the Summer School, and six hours a day for the remainder of the time.

### **The Laboratories.**

The University has an observatory and a large number of laboratories more or less fully equipped for routine instruction and for original research. The laboratories (omitting those connected exclusively with the work of the Engineering, Medical, and Dental Schools) are: the Botanical, Chemical, Geological, Histological, Hygienic, Physical, Physiological, Psychological, and Zoological. For a fuller account of them and their various resources, as also of the University collections for the study of art, archæology, ethnology, mineralogy, palæontology, systematic zoology, etc., consult the annual Calendar, which may be had gratis on application to Mr. James H. Wade, Secretary of the University.

### **Societies.**

There are connected with the University a number of voluntary literary, philosophical, and scientific organizations which add not a little to the graduate student's opportunity for general training. The membership of these societies consists usually of University teachers and advanced students who are pursuing a common specialty. They are variously organized and meet weekly, fortnightly, or monthly, as the case may be, for the reading and discussion of formal papers, for reports upon observation and experiment, reviews of recent literature, etc.

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## **ORGANIZATION OF GRADUATE WORK.**

### **The Graduate School.**

The Graduate School was organized in the Spring of 1892 in connection with the Department of Literature, Science, and the Arts. Its purpose is to bring into increased prominence the numerous advanced courses offered in that department—courses that have developed during



the past few years from the continual extension of the elective system,—and to recognize and announce them as something distinct from the work of an ordinary college course. It aims to make provision for a more systematic and efficient administration of the higher work, and, so far as possible, for the separate instruction of graduate students. It also aims to lay foundations for the future development of university (as distinguished from collegiate) work. The management of the School is entrusted to an Administrative Council, of which the President of the University is chairman.

The regulations of the University respecting graduate work, that were formerly in force, have been modified in a few particulars by the Council, and it is possible that still further changes may be made in the year to come. The more important of these regulations are explained in the pages that follow.

### **The University System.**

Every graduate student who is a candidate for a higher degree, works upon the so-called 'university system,' the essential features of which are specialization of study, a final examination, and a thesis. The student selects a 'major study' and, in general, two 'minor studies,' his selection being subject, however, to the approval of the Council. When the choice has been made and approved, the student's work is henceforth under the immediate supervision of a committee consisting of those professors who have charge of the studies chosen, the one having charge of the major study being chairman. This committee arranges a course of study suited to the desires, needs, and previous attainments of the student, assists him in the choice of a subject for a thesis, passes judgment upon his thesis when it is written, conducts his examination, and, if he passes, reports him to the Council as worthy of the degree sought. The nature of the work prescribed, and of the committee's oversight, varies more or less according to the subject chosen, the degree sought, and the previous attainments of the student. The work may consist of attendance upon certain specified courses of study, of reading to be done privately and reported upon, or of an original research to be carried on more or less independently. The requirement of a thesis is sometimes waived in the case of a candidate for a *master's* degree. It may be added also that for the master's degree the Council may, at its discretion, approve a course of study which does not confine the candidate rigorously to a major and two minor studies.

Graduate students who do not wish to work for a higher degree are admitted to any course offered in the Department of Literature, Science, and the Arts, upon satisfying the professor in charge that they are qualified to pursue the work to advantage.

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## THE HIGHER DEGREES.

### Degrees Conferred.

The degrees conferred on the completion of approved courses of study in the Graduate School are those of Master of Arts, Master of Philosophy, Master of Science, Master of Letters, Doctor of Philosophy, and Doctor of Science.

### The Masters' Degree.

A Bachelor of this University, or of any other reputable university or college, may become a candidate for the corresponding master's degree, and may be recommended for the degree after one year's residence at the University, provided he pass a satisfactory examination on the course of study approved by the Administrative Council. A thesis may, or may not, be included in the requirements for a degree, as the committee in charge of the student's work may determine.

The practice of allowing graduates of this University to enter upon studies *in absentia* as candidates for a master's degree, has been discontinued. But a graduate who has already completed a considerable portion of the term of residence prescribed for a master's degree, may be allowed to continue his studies for the degree, without further residence at the University, on such conditions as the Administrative Council may determine in each case. *This privilege is restricted to graduates of this University.*

A student properly qualified may be permitted to pursue at the same time studies for a master's degree and studies in any of the professional schools, on condition that the term of study and residence in the Graduate School be extended to cover at least two years..

### The Doctors' Degrees.

1. The doctors' degrees are open to all persons who have received a bachelor's degree, but no student will be accepted as a candidate for a doctor's degree who has not a knowledge of French and German sufficient for purposes of research. The degree of Doctor of Philosophy is the one usually conferred; though candidates who pursue studies along scientific lines may, at their option, receive the degree of Doctor of Science.

2. It is not intended that the doctors' degrees shall be won merely by faithful and industrious work for a prescribed time in some assigned course of study, and no definite term of required residence can be specified. As a rule, three years of graduate study will be necessary, the last two semesters of which must be spent at this University. The period of three years, however, may be shortened in the case of students

who, as undergraduates, have pursued special studies in the direction of their proposed graduate work.

3. No student will be enrolled as a candidate for a doctor's degree until he has been in residence as a graduate student for at least one year. [This rule may be waived in the case of those who come properly accredited from a Graduate School of some other university, and of those who, as undergraduates in this University, have shown special proficiency in the line of their proposed graduate work.]

4. A student wishing to become a candidate for a doctor's degree must make a formal application to be so enrolled at least two semesters prior to the time for presenting himself for examination.

5. A candidate for a doctor's degree must take a major study that is substantially co-extensive with some one department of instruction in the University. He must also take two minor studies, one of which may be in the same department as the major, but involving a more thorough treatment of the same. Both minors must be cognate to the major, and all studies must be subject to the approval of the Administrative Council.

6. **THE THESIS.**—The thesis is of great importance. It must exhibit creditable literary workmanship and a good command of the resources of expression, but it must depend for acceptance more upon its subject-matter than upon its formal or rhetorical qualities. It must be an original contribution to scholarship or to scientific knowledge. The inquiry should be confined within narrow bounds. The treatment should be as concise as the nature of the subject permits, and show familiarity with the history of the problem treated, with the literature bearing upon it, and with the latest methods of research applicable to it. Every thesis should contain a clear introductory statement of what it is proposed to establish or investigate, and likewise a final résumé of results. It should also be accompanied by an index of contents and a bibliography of the subject. It is expected that the preparation of an acceptable thesis will usually require the greater part of an academic year.

### **Special Regulations Relating to the Higher Degrees.**

1. Applicants for an advanced degree are required to announce to the Council, through the Secretary, as early as the fifteenth of October of each year, the particular branches of study to which they wish to give special attention. The supervision of their work will then be entrusted to the proper committee.

2. The subject of the thesis for a doctor's degree must be chosen, and must be approved by the committee concerned, as early as the first of November of the college year in which the applicant expects to take his

degree, and the subject of the thesis for a master's degree, when required, must be chosen and approved as early as the first of December.

3. The thesis must be completed and put into the hands of the chairman of the proper committee as early as the first of May of the year in which the applicant expects to take the degree.

4. The thesis must be prepared for close scrutiny with reference not only to its technical merits, but also to its merits as a specimen of literary workmanship. It must be preceded by an analytical table of contents, and a carefully prepared account of the authorities made use of.

5. The thesis must be read and defended in public at such time as the Council may appoint; and, in case of a master's degree, a bound copy, either written or printed, must be deposited in the University library.

6. Every candidate for the degree of Doctor of Philosophy or Doctor of Science, in case of the acceptance of his thesis, is required to deposit in the University library a type-written copy of the thesis, and to have it printed, in full or in part as may be approved by the responsible committee. He is also required to present twenty-five copies of the printed thesis to the University library. To guarantee the printing of the thesis every candidate for the doctor's degree is required to deposit with the Treasurer of the University, between the date of the acceptance of his thesis and the time fixed for his examination, the sum of fifty dollars, which deposit will be returned to him in case of failure to pass his examination, or whenever he shall cause his thesis to be printed at his own expense, or shall have it published in a form and under auspices approved by the responsible committee.

In the printing of the thesis at his own expense the candidate will be expected to use good substantial paper and sightly typography. A page four inches by six, with outside margins of at least one inch, is recommended.

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## ADMISSION AND REGISTRATION.

All applicants for admission to the Graduate School must first report to the Dean of the Department of Literature, Science, and the Arts, and present their credentials. They will then be referred to the Secretary of the Administrative Council for the arrangement of courses of study.

The privileges of the school are open to graduates of the Department of Literature, Science, and the Arts of this University, and to graduates of other universities and colleges who satisfy the Administrative Council that they are qualified to pursue with profit the advanced courses of study offered in the school.

Graduates of institutions where the undergraduate courses of study

are not substantially equivalent to the course prescribed at this University are ordinarily required to do an additional amount of undergraduate work, or to prolong their term of residence, before being admitted to full candidacy for a higher degree.

Graduates of this University, or of other institutions, who do not wish to become candidates for a degree, may be admitted and registered as special resident graduates.

Graduates of other institutions who are candidates for a bachelor's degree in the Department of Literature, Science, and the Arts, are not registered in the Graduate School.

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## FEES AND EXPENSES.

**Matriculation Fee.**—Every student before entering any department of the University is required to pay a matriculation fee. This fee, which for citizens of Michigan, is ten dollars, and for those who come from any other state or country, twenty-five dollars, is paid but once, and entitles the student to the privileges of permanent membership in the University.

**Annual Fee.**—In addition to the matriculation fee, every student has to pay an annual fee for incidental expenses. This fee in the Department of Literature, Science, and the Arts is, for Michigan students, thirty dollars; for all others, forty dollars. It is paid the first year of residence at the University, and every year of residence thereafter. Resident graduates are required to pay the same annual fee as undergraduates. Graduate students studying *in absentia* for a master's degree pay an annual fee of ten dollars.

The matriculation fee and the annual fee must be paid at the beginning of the academic year. A by-law of the Board of Regents provides that no student or graduate shall be allowed to enjoy the privileges of the University until he has paid all fees that are due.

**Laboratory Expenses.**—Students who pursue laboratory courses of study are required to pay for the materials and apparatus actually consumed by them. The deposits required in advance are different in the different courses, ranging from one to twenty dollars. The laboratory expenses of students will vary with their prudence and economy. Experience has shown that in the chemical laboratory the average expense for all courses is about one dollar and twenty cents a week.

**Diploma Fee.**—The fee for the diploma given on graduation is ten dollars, and the by-laws of the Board of Regents prescribe that no person shall be recommended for a degree until he has paid all dues, including the fee for diploma.

**Other Expenses.**—Students obtain board and lodging in private families for from three to five dollars a week. Clubs are also formed in which the cost of board is from one dollar and a half to two dollars and a half a week. Room rent varies from one dollar to three dollars a week for each student. The annual expenses of students, including clothing and incidentals, are, on the average, about three hundred and seventy dollars. Students on arriving in Ann Arbor can obtain information in regard to rooms and board by calling at the office of the Secretary of the University in University Hall.

There are no dormitories, no commons, and no stipends available for students in the Graduate School (with the exception of the Elisha Jones classical fellowship).

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## COURSES OF INSTRUCTION.

The following list of advanced courses does not attempt in all cases to discriminate graduate from undergraduate instruction; the reason being that the possession of a bachelor's degree may mean much or little as regards a student's proficiency in a particular subject. With a few exceptions, the courses here mentioned all presuppose a somewhat extensive preliminary study of the subject, a study covering from one to six or more years according to the circumstances. In some instances the attempt is made to indicate, in terms of both time and work, the amount of preparation required for entrance upon the courses described. Many of the courses are advanced electives which are open to undergraduates, but have been shown by experience to be suited to the needs of many graduates. Different departments of instruction have adopted different modes of announcing their work. For further information reference may be made directly to the head of the department concerned.

### GREEK.

The courses here announced presuppose, in general, four years previous study of Greek, viz., the usual preparatory course of two years, and two years of collegiate study devoted to the history of Greek literature and to reading from Lysias, Xenophon, Homer, Demosthenes, the Tragic Poets, and Aristophanes.

Professor D'OUGE or Mr. DE COU:—

#### Teachers' Course.

This course is intended to give students who expect to teach Greek training in teaching the elements of inflection and syntax. Lectures are given on the chief results of the modern comparative treatment of Greek sounds and inflections.—*Two hours a week, first semester.*

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## The History of Greek Art from the beginning to the Roman Period.

Gardner's Handbook of Greek Sculpture and Collignon's Manual of Greek Archæology are made the basis of a more general study.—*Three hours a week, first semester.*

## Seminary in Tragedy.

Interpretation of the Electra, the Philoctetes, and the Oedipus at Colonus of Sophocles, with special reference to the principles of Greek dramatic art, and the chief problems of textual criticism.—*Three hours a week, first semester.*

[In 1900-01 several of the representative plays of Euripides will be read, with special reference to the dramatic art of the poet, his relation to his own times, his metres, and his dramatic innovations.]

## [The Nicomachean Ethics of Aristotle, Books I-IV and X.

*Two hours a week, first semester.* This course is omitted in 1899-1900.]

## [Pindar: the Olympian and Pythian Odes, and Bacchylides.

*Three hours a week, second semester.* This course is omitted in 1899-1900.]

## [Greek Antiquities.

Lectures on the monuments and the private life of the ancient Athenians. Illustrated by stereopticon views.—*One hour a week, second semester.* This course is omitted in 1899-1900.]

## Introduction to Homer.

A study of the peculiarities of the epic dialect and the Homeric verse. Intended especially for those who expect to teach Greek.—*Three hours a week, second semester.*

## Lucian.

A course in rapid reading and a study of the life and times of the writer.—*Two hours a week, second semester.*

## The Greek Dialects.

Reading of Cauer's Delectus Inscriptionum Graecarum.—*Two hours a week, second semester.*

[The Athenian Constitution of Aristotle.

With special reference to the judicial and political antiquities of Athens.—*Two hours a week, second semester.* This course is omitted in 1899–1900.]

Professor PATTENGILL:—

[Studies in Plato.

The Symposium and other dialogues will be interpreted.—*Three hours a week, first semester.* This course is omitted in 1899–1900.]

The Legal Orations of Isaeus and Demosthenes.

With special reference to Attic law and judicial procedure.—*Three hours a week, first semester.*

[Theocritus, Bion, and Moschus.

*Three hours a week, second semester.* This course is omitted in 1899–1900.]

The Greek Minor Poets.

*Three hours a week, second semester.*

Dr. WAIT:—

Introduction to Greek Epigraphy, and Reading of Inscriptions.

*Two hours a week, first semester.*

Teachers' Course.

Greek writing.—*Two hours a week, second semester.*

THE CLASSICAL FACULTY:—

Reports on Classical Philology.

Throughout the year members of the Classical Faculty and the graduate students meet *once a week* to present and to hear analyses and reviews in the domain of the Greek and Latin languages and literatures, and reports of recent researches and explorations in Greek and Roman archæology, history, and antiquities.

LATIN.

The courses here announced presuppose, in general, seven or eight years' previous study of Latin, viz., the usual preparatory course of four years, and three or four years of collegiate study devoted to Livy, Cicero,



Horace, Terence, Latin writing, and the systematic study of Roman literature.

The courses in ancient philosophy (see pages 31 to 35) are strongly recommended to classical students.

Professors KELSEY and ROLFE:—

Latin Seminary: Roman Satire.

Open to graduate students only.—*Two hours a week, throughout the year.*

Professor KELSEY:—

Caesar's Gallic War (Teachers' Course, A).

Lectures. Papers prepared by those taking the course. Critical study of the text of the Gallic War, on the basis of Meusel's edition; studies in the syntax and military antiquities.—*Five hours a week, first semester.*

Virgil (Teachers' Course, B).

Critical study of select portions of the Bucolics, Georgics, and Aeneid, on the basis of Ribbeck's large edition.—*Three hours a week, second semester.*

Lucretius.

Interpretations and lectures.—*Two hours a week, first semester.*

[Introduction to Classical Philology.

Lectures. A brief outline of the history and present condition of classical studies is presented, followed by an extended discussion of the methods employed in classical philology. Attention is also paid to the bibliography of the subject.—*Three hours a week, second semester.* This course is omitted in 1899–1900.]

Introduction to Roman Archæology.

Lectures on the architecture and topography of Ancient Rome, and on sculpture and painting in the Roman period. This course will be illustrated by photographs, engravings, and the occasional use of stereopticon slides.—*Three hours a week, second semester.*

[Latin Inscriptions.

Readings of inscriptions of different periods from squeezes and facsimiles. Interpretation of inscriptions with special reference to the study of life and society under the Early Empire.—*Three hours a week, second semester.* This course is omitted in 1899–1900.]

## Professor ROLFE:—

## Latin Grammar.

Lectures on the phonology and morphology of the Latin language, with an outline of the syntax scientifically considered.—*Three hours a week, first semester.*

## Proseminary in Latin Grammar.

Studies in Latin syntax.—*Two hours a week, second semester.*

## [The Italic Dialects.

Lectures on the phonology and morphology of the dialects, with the interpretation of selected inscriptions.—*Two hours a week, second semester.* This course is omitted in 1899–1900.]

## [The Letters of Pliny the Younger.

Interpretation of selected letters, with a study of Roman life and society at the end of the first century, A. D.—*Three hours a week, first semester.* This course is omitted in 1899–1900.]

## Latin Writing (A).

Attention is given not only to correctness of expression but also to matters of style and the finer distinctions of the language.—*Two hours a week, first semester.*

## Latin Writing (B).

Lectures on Latin style, with collateral reading and written exercises.—*Three hours a week, second semester.*

## Assistant Professor DRAKE:—

## Roman Political Institutions.

Lectures, presenting a systematic analysis of the governmental institutions of the Roman Empire.—*Two hours a week, first semester.*

## Historical Proseminary.

Study of historical subjects from the sources: The age of the Antonines.—*Two hours a week, second semester.*

## The Germania and Agricola of Tacitus.

Interpretations and lectures.—*Two hours a week, first semester.*

## [Suetonius and Velleius Paterculus.

Lectures and interpretations.—*Three hours a week, first semester.* This course is omitted in 1899–1900.]

**Roman Law.**

Lectures. History of Roman legislation to the time of Justinian. The Institutes of Justinian. Points of similarity and contrast between Roman and English law.—*Three hours a week, second semester.*

Professors KELSEY and ROLFE and Assistant Professor DRAKE:—

**Reports on the Progress of Research.**

Analysis and criticism of important articles in the domain of the Latin language and literature, Latin grammar and lexicography, Roman history, and Roman archæology and antiquities, by members of the Faculty and members of the Latin Seminary.—*Two hours a week, throughout the year.*

Dr. DENNISON:—

**Introduction to Latin Palæography.**

Lectures on the various styles of writing found in Latin manuscripts, with exercises in reading from facsimiles.—*Two hours a week, first semester.*

Mr. MEADER:—

**Christian Latin.**

Interpretations of selections from the early Latin writers of the Christian church, with illustrative lectures upon Christian archæology and antiquities.—*Three hours a week, second semester.*

**SANSKRIT.**

Before beginning the study of Sanskrit, the student should have pursued courses in Greek and Latin for at least four semesters or, instead of either Greek or Latin, Germanics of the early period.

Dr. WAIT:—

**Beginners' Course.**

Grammar, and exercises in translation and composition. Text-books: Perry's Sanskrit Primer and Whitney's Grammar.—*Three hours a week, first semester.*

**Second Course.**

Interpretation of the prose selections contained in Lanman's Sanskrit Reader, with elementary studies in the comparative morphology of the more important cognate languages.—*Three hours a week, second semester.*

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**SEMITICS.**

The courses in Semitics are intended for:—(1) students who are seeking a liberal culture; (2) students of "classical" and modern languages, to furnish them with *necessary* data for the study of the philosophy of language and phonetic laws; (3) students who wish to make a special study of Semitics (the courses leading to the degree of Doctor of Philosophy); (4) students of ancient history; (5) students of art and archæology; (6) students of ethics and theology.

Professor CRAIG:—

**Hebrew.\***

1. Genesis. Baer and Delitzsch's Text. Harper's Elements of Grammar. Craig's Hebrew Word Manual.—*Three hours a week, first semester.*

2. Deuteronomy, Joshua, I Samuel, Ruth, Jonah. Theile's Biblia Hebraica. Davies's Lexicon.—*Three hours a week, second semester.*

3. Prophetic Literature: Amos and Isaiah. Study of the nature and content of prophecy in its literary, historical, and ethical aspects. Text-books: Hebrew Bible, Driver's Hebrew Moods and Tenses.—*Two hours a week, first semester.*

4. The Book of Job, including study of the literary structure and critique of the dominant ideas. Baer and Delitzsch's Text and Haupt's Polychrome Edition (text by Siegfried).—*Two hours a week, second semester.*

**Assyrian.**

1. Introduction to Easy Historical Inscriptions from the Ninth Century, B. C., with study of the grammar. Text-books: Delitzsch's Assyrische Lesestücke, dritte Auflage.—*Three hours a week, first semester.*

2. Historical Inscriptions. Selections from the Cuneiform Inscriptions of Western Asia (R. I-V).—*Second semester.*

3. The Babylonian Stories of Creation, the Deluge, and the War of Marduk against Tiamat, with lectures on the Cosmology of the Babylonians. Inscription of Tiglathpileser I, circa 1120 B. C.—*Two hours a week, first semester.*

4. Religious Literature. King's "The Prayers of the Lifting-up of the Hand." Craig's "Religious Texts."—*Second semester.*

5. Seminary in Sumerian.—*Two hours a week, first semester.*

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\* Candidates for a higher degree who wish to elect a Semitic language as one of the subjects leading to the degree, must have previously completed Courses 1 and 2 in Hebrew or an equivalent thereto in some Semitic language.

## History and Archæology.

Lectures on the Ancient Babylonians, Assyrians, Hebrews, Phoenicians. The lectures are based on the study of the monuments.

## Arabic.

1. Introductory Course. Grammar and reading. Socin's Arabic Grammar (English edition) and Brünnow's Chrestomathy.—*Two hours a week, first semester.*

2. Selected Suras from the Quran, Chrestomathia Qurani Arabica, Nallino, with introductory lectures on the life of Muhammed and Muhammedanism.—*Two hours a week, first semester.*

## HELLENISTIC GREEK.

Professor CRAIG:—

### New Testament.

Gospel of John, including grammatical study of the peculiarities of Hellenistic Greek, and historical introduction to the book. Text-Books: Westcott and Hort's Greek New Testament, revised edition with introduction by Ph. Schaff; Thayer's Winer's New Testament Grammar; Thayer's Greek-English Lexicon.—*Two hours a week, first semester.*

### Septuagint.

Introductory lectures with selected readings from the historical and prophetic books. Apocrypha; Maccabees, Books I and II. Text-books: Vetus Testamentum Græce by L. Van Ess, or The Old Testament in Greek by H. B. Swete, Vols. I-III. Grammar and lexicon as in the first semester, and Liddell and Scott's Lexicon.—*Two hours a week, second semester.*

## FRENCH.

The advanced and graduate courses here described presuppose in the student a reasonable knowledge of the spoken and written language and an acquaintance with modern French literature, such as are to be obtained from Courses 1, 2, 3, 4, 5, and 6 of the Announcement of the Department of Literature, Science, and the Arts for 1899-1900, or from Courses 1, 2, 3, 6, 7, 8, 20, 21, described in the University Calendar for 1898-1899, pages 67 to 69.

Courses 5 and 6, mentioned above, offered by Assistant Professors de Pont and Levi in the first and second semesters respectively, are advanced practical courses in French composition and style, and are especially recommended to those who intend to devote themselves to teaching French.

Assistant Professor DE PONT.

Dramatists of the Eighteenth Century.

Lectures and reports. This course is designed to furnish a survey of the French drama from the Classical to the Romantic School.—*Two hours a week, second semester.*

Assistant Professor DE PONT and Mr. ———:—

Prose Writers of the Eighteenth Century.

Montesquieu; Voltaire; Diderot; Rousseau.—*Two, or four, hours a week, second semester.*

Assistant Professor LEVI:—

Poetry of the Nineteenth Century.

Lamartine; de Musset; de Vigny; Hugo.—*Two hours a week, first semester.*

History of French Literature in the Seventeenth, Eighteenth, and Nineteenth Centuries.

A general survey. Lectures, reports, reading.—*Two hours a week, throughout the year.*

Assistant Professor LEVI and Mr. ———:—

The Classic Drama: Corneille, Racine, and Molière.

Recitations, reports, lectures.—*Two, or four, hours a week, first semester.*

Dr. EFFINGER:—

The Dramatic Literature of the Nineteenth Century.

This course will comprehend a study of the drama in the nineteenth century, beginning with the theatre of the Revolution and the melodrama, and covering the romantic movement, the classical reaction, and the rise of the modern school.—*Three hours a week, throughout the year.*

Dr. BOURLAND:—

Historical French Grammar.

Lectures on phonology and morphology, with practical exercises in reading Old French, and collateral reading.—*Two hours a week, throughout the year.*

Dr. THIEME:—

**French Literature of the Sixteenth Century.**

This course treats the transitions from the Middle Ages to the Renaissance and from the Sixteenth to the Seventeenth Century, with special study of Marot, Ronsard, Rabelais, Montaigne, Calvin, Jodelle, Garnier, and Hardy. Lectures, reading, reports.—*Three hours a week, first semester.*

**French Literary Criticism in the Nineteenth Century.**

The principles of literary criticism before Sainte Beuve. Study of Sainte Beuve, Taine, and Brunetière.—*Three hours a week, second semester.*

Mr. ———:—

**Classic French Prose.**

Pascal: La Bruyère; Bossuet; Sévigné; Saint Simon: La Rochefoucauld. Recitations with lectures and reports.—*Two hours a week, first semester.*

**ITALIAN.**

The minimum requirement for admission to the courses announced below consists in Courses 1 and 2 described in the University Calendar for 1898-99, page 69, or an equivalent.

Assistant Professor LEVI:—

**Dante: La Vita Nuova.**

*One hour a week, first semester.*

**Dante: La Divina Commedia.**

Lectures on the life and works of Dante, with special reference to the interpretation of the Divine Comedy. Recitations and reports on assigned reading.—*Three hours a week, second semester.*

**SPANISH.**

The minimum requirement for entrance to the advanced courses in Spanish, announced below, consists in Courses 1 and 2 described in the University Calendar for 1898-99, page 70, or an equivalent.

Dr. BOURLAND:—

**Calderon: La Vida es Sueño. Cervantes: La Jitanilla.**

In connection with this course, opportunity is offered for collateral readings in Lope de Vega and Tirso de Molina, and for a closer study of the classic Spanish Drama.—*Two hours a week, first semester.*

## Cervantes: Don Quijote.

It is intended that this course be made the basis of a thorough study of the life and works of Cervantes.—*Two hours a week, second semester.*

### GERMAN.

The advanced and graduate courses in German, announced below, presuppose a reasonably thorough and extended knowledge of the written and spoken language, and an acquaintance with some of the masterpieces of modern German literature, both of which may be obtained from the undergraduate work not here mentioned. The minimum requirements of undergraduate preparation for the graduate courses consists in Courses 1, 2, 3, 4, 5<sub>1</sub>, 6<sub>1</sub>, and options in 5<sub>a</sub>, 5<sub>b</sub>, 6<sub>a</sub>, and 6<sub>b</sub>, as described in the University Calendar for 1898-99, pages 70 to 72 or work equivalent to the courses mentioned.

Courses 5<sub>a</sub>, 5<sub>b</sub>, 6<sub>a</sub>, and 6<sub>b</sub> are primarily intended for undergraduates, and are recommended for graduates who wish to study the chief dramas of the classical period.

Professor HENCH:—

## Methods of Teaching Modern Foreign Languages.

An examination into the underlying principles of life and growth in language with special reference to language-teaching; a brief historical account of the more important contributions to the methodology of language-teaching since the Renaissance, and a critical review of the leading methods of teaching modern languages at present employed or advocated in this country and abroad; suggestions and model lessons. A collection of illustrative material for class instruction (maps, charts, and pictures) and of reference books for the teacher will be on exhibition, for inspection and circulation. Lectures, assigned readings, and reports. Advanced course open to undergraduates and graduates.—*Two hours a week, second semester.*

## The Elements of Phonetics and Modern German Sounds.

With a series of introductory lectures on the Rise of the Modern German Schriftsprache. Lectures and practical exercises with frequent reference to Hempl's German Orthography and Phonology and Grandgent's German and English Sounds. Advanced course open to undergraduates and graduates.—*Two hours a week, first semester.*

## German Syntax.

Lectures and reports upon assigned topics. Paul, Principien der Sprachgeschichte, 3 Aufl.; Wegener, Untersuchungen über die Grund-



fragen des Sprachlebens; Erdmann-Mensing, Grundzüge der deutschen Syntax; Kern, Die deutsche Satzlehre, 2 Aufl.; Wunderlich, Der deutsche Satzbau. Advanced course open to undergraduates and graduates.—*Three hours a week, second semester.*

### History of German Literature.

Lectures, and readings from Max Müller's German Classics. A survey of German literature in its development from the beginnings down to the death of Goethe, with special regard to important epochs, notable literary monuments, and underlying intellectual movements. Vogt and Koch, Geschichte der deutschen Literatur von den ältesten Zeiten bis zur Gegenwart. Advanced course open to undergraduates and graduates.

I. From the earliest time to the end of the Middle Ages.—*Two hours a week, first semester.*

### Middle High German.

Lectures and recitations with assigned readings. This course is intended to serve as an introduction to Middle High German; incidentally it includes a brief sketch of the historical development of Modern German phonology and inflection. The selections read are drawn from homiletic prose, folk-epic, court-epic, and lyric; and in the translation of these into Modern German special attention is paid to the principles underlying change in word-signification. Paul, Mittelhochdeutsche Grammatik, 4 Aufl., and Bachmann, Mittelhochdeutsches Lesebuch. Advanced course open to undergraduates and graduates.—*Three hours a week, first semester.*

### Proseminary in Old High German.

Special studies in the style of Isidor and the Monsee Fragments. Primarily for graduates.—*Two hours a week, second semester.*

### Assistant Professor WINKLER—

#### Goethe's Faust.

Lectures and recitations. Thomas's edition. The drama is studied as a work of art, and the life and thoughts of Goethe, affording the basis for its interpretation, are carefully reviewed and analysed. An excellent Goethe library, which contains the most important critical material on Faust, affords ample opportunity for special study. Advanced course open to undergraduates and graduates.—*Two hours a week, throughout the year.*

### History of German Literature.

II. Modern Period.—*Three hours a week, second semester.*

### German Romanticism.

Lectures and assigned readings. The beginnings of German Romanticism. Influence of Kant, Fichte, and Schelling upon the Romantic movement. Its relation to German Classicism and to the social and political life of the times. The younger Romantic movement. The period of the wars of liberation. The intellectual movement leading to the revolution of 1848. Advanced course open to undergraduates and graduates.—*Two hours a week, throughout the year.*

### Proseminary in Modern German Literature.

The Storm and Stress Movement. Study of the sources, and the social and literary conditions of Germany, that gave rise to the movement. Reports, discussions, and lectures. Primarily for graduates.—*Two hours a week, first semester.*

Dr. MENSEL:—

### Introductory Course in Old High German:—

Lectures based upon Braune's *Abriss der althochdeutschen Lautlehre*, 2 Aufl., and readings from Braune's *Althochdeutsches Lesebuch*, 4 Aufl. The course will include a review of the history of the literature of the period. Primarily for graduates.—*Two hours a week, first semester.*

### The Middle High German Folk-Epic.

Lectures, with collateral readings, on the characteristic features, composition, legendary setting, language, and metre of the folk-epic. Reading and interpretation of selections from the *Nibelungenlied*, *Gudrun*, and minor epics. Reports on assigned topics. Advanced course open to undergraduates and graduates.—*Two hours a week, second semester.*

Dr. BOUCKE:—

### The History of German Civilization.

Lectures and readings from Gustav Freytag's *Bilder aus der deutschen Vergangenheit*. This course is intended to supplement the course on German literature, and to give a survey of the historical development of German culture in its various expressions, up to the beginning of this century, with special regard to the more important epochs. Advanced course open to undergraduates and graduates.—*Two hours a week, first semester.*

## Modern German Civilization.

Lectures, assigned readings, and reports. The aim of this course is the same as that of the preceding one, while it deals with the present conditions of German culture, with topographical and political questions, customs and habits, dialects, myths, and folk-lore. Advanced course, open to undergraduates and graduates.—*Two hours a week, second semester.*

Dr. FLORER:—

## The Literature of the Sixteenth Century.

Lectures, and readings of selections from Braune's *Neudrucke deutscher Litteraturwerke des XVI und XVII Jahrhunderts*. This course is intended to serve as a supplement to the course in Middle High German. Special attention is paid to Luther and his influence upon the language. Advanced course open to undergraduates and graduates.—*Two hours a week, throughout the year.*

## GOTHIC.

Professor HENCH:—

### Introductory Course.

Lectures on phonology and morphology, and reading of the Gospels. Streitberg's *Gotisches Elementarbuch*. This course serves as an introduction to the study of Germanic Philology. Primarily for graduates.—*Three hours a week, first semester.*

## SCANDINAVIAN.

Professor HENCH:—

### Old Icelandic.

Introductory course. Lectures and reading of selections from the Sagas. Kahle's *Altisländisches Elementarbuch*. Primarily for graduates.—*Two hours a week, second semester.*

## ENGLISH PHILOLOGY AND GENERAL LINGUISTICS.

Professor HEMPL:—

### Old English. \*

A general introduction to the subject.—*Four hours a week, first semester.*

### Old English Phonology and Morphology.

A study of the early West-Saxon prose, with special reference to sound and inflection.—*Three hours a week, second semester.*

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\* The term "Old English" is used in this Announcement for the period of English often called "Anglo-Saxon."

### [Old English Syntax.

The investigation of specific problems, together with a brief general survey of the subject.—*Two hours a week, first semester.* This course is omitted in 1899-1900.]

### [Old English Poetry.

A study of early English Literature, with special reference to the poetical monuments.—*Three hours a week, second semester.* This course is omitted in 1899-1900.]

### Middle English.

A brief introduction to the subject and a special study of some problems or groups of problems.—*Two hours a week, second semester.*

### [Historical English Grammar.

A general survey of the subject, and the investigation of the origin and development of impugned Modern-English idioms.—*Two hours a week, first semester.* This course is omitted in 1899-1900. See the following course.]

### The History of the English Language.

Lectures on the most important factors in the development of the English language, together with the investigation of certain problems of general interest.—*Two hours a week, first semester.*

### Spoken English.

2 A study of colloquial English as distinguished from the English of books and of formal speech, and the investigation of the more important facts as to the fortunes of English speech in this country.—*Two hours a week, first semester.*

### [Phonetics.

1. A study of the elements of speech-sounds with application to the chief ancient and modern languages.—*Two hours a week, second semester.* This course is omitted in 1899-1900, but a brief outline of the subject is given in the course on Spoken English.]

### Principles of Linguistic Science.

2 Lectures on the more important principles underlying the life and growth of language. This course is intended to furnish to students of either classical or modern languages an explanation of the many phenomena of the languages they are studying, and to bring these scattered data under a limited number of general principles.—*Two hours a week, second semester.*

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**ENGLISH AND RHETORIC.**

The advanced work of this department proceeds along two main lines:—English and American Literature, and Rhetoric. Advanced courses in Oratory are also offered in connection with this department.

The following courses (open also to undergraduates who are prepared to take them) will ordinarily be found adapted to the needs of graduate students. In case of students who have specialized in English for their first degree, additional advanced courses for graduate study are provided after conference with the candidate. Some of the courses given in recent years are the following: The Development of the English Novel; The English Satirists of the Seventeenth and Eighteenth Centuries; The Romantic Revival in England at the close of the last century; The Pre-Shakespearian Drama in England; Shakespeare's Histories.

See also the courses in English Philology and General Linguistics on pages 25 and 26.

Professor DEMMON:—

**English Literature Seminary.**

Each student is expected, first, to present two papers during the semester, one an essay upon an assigned masterpiece, the other a critique of a fellow-student's essay; second, to participate each week in a general *ex tempore* discussion of the work under consideration; third, to read the entire list of works with which the course deals, together with such critical literature on each subject as there may be time for. The aim of the course is to lay a foundation for correctly estimating literary masterpieces of widely varying types. The list of masterpieces is as follows: More's Utopia; Bacon's Essays; Milton's Areopagitica; Carlyle's Sartor Resartus; George Eliot's Silas Marner; Spenser's Faery Queen, Book I; Shakespeare's Sonnets; Milton's Paradise Lost; Dryden's Absalom and Achitophel; Pope's Essay on Man; Wordsworth's Excursion; Browning's Soul Tragedy; Tennyson's Maud; Swinburne's Atalanta in Calydon.—*First semester.*

**Shakespeare Seminary.**

The method is similar to that in the preceding course. The plays selected are: A Midsummer Night's Dream; The Merchant of Venice; As You Like It; Twelfth Night; The Tempest; Richard III; the two parts of Henry IV; Romeo and Juliet; Hamlet; Othello; King Lear; Macbeth; Coriolanus.—*Second semester.*

**American Literature Seminary.**

Authors studied: Irving, Cooper, Bryant, Emerson, Hawthorne, Longfellow, Whittier, Poe, Holmes, Thoreau, Lowell, Bayard Taylor,

Howells and James. Representative works of the authors named are studied, and an attempt is made to discover the distinctly American element by a comparative study with British authors.—*Second semester.* When this subject is taken for an advanced degree, individual work is assigned for the first semester, upon which the candidate is expected to make weekly reports.

### Principles of Criticism.

Lectures. Candidates who take their major in English Literature are expected to take this course in connection with the seminary work in English Literature and Shakespeare.—*Throughout the year.*

### Studies in the text of Shakespeare.

The aim will be to illustrate the methods of textual study as applied to a play like Hamlet, and the difficulties to be overcome in establishing a text. The McMillan Shakespeare Library affords a very full apparatus for these studies.—*Two hours a week, first semester.*

### Professor SCOTT:—

#### Development of Rhetorical Theory.

A historical and comparative study of the growth of rhetorical theory from Aristotle to the present time.—*First semester.*

#### Principles of Style.

Inductive study of masterpieces of English prose, with a view to verifying rhetorical principles. Lectures, readings, discussions.—*Second semester.*

#### Teachers' Course.

Methods of teaching English Composition and Rhetoric.—*Second semester.*

### Professor TRUEBLOOD:—

#### Study of Great Orators, ancient and modern.

Lectures on methods of public address and source of power. Study of representative selections. The method is similar to that in the English Literature Seminary.—*Throughout the year.*

#### Oral Discussions.

This course is designed to develop readiness of extemporization. It involves the application of the principles of formal logic and elocution in the discussion of leading topics of the day. Students are required to present briefs of the subjects discussed.—*Second semester.*

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**MUSIC.**

Courses are given in the University, but not here enumerated, that provide instruction in the science and practice of choral music, the science of harmony, and simple and double counterpoint. The courses named below are intended for graduate students.

Professor STANLEY:—

Canon and Fugue.

*Two hours a week, throughout the year.*

Musical Form.

*Two hours a week, throughout the year.*

Free Composition.

*Two hours a week, throughout the year.*

Instrumentation.

*Two hours a week, throughout the year.*

Original work in research will be required of candidates for a doctor's degree, who take music as one of their subjects.

**HISTORY.**

The graduate work described below presupposes such information and training as is represented by undergraduate Courses 1, 2, and 3 as described in the University Calendar for 1898-99, pages 78 and 79, supplemented by one or more advanced undergraduate courses. In indicating the courses named below as adapted to the needs of graduate students, it is not intended to exclude other advanced undergraduate courses, especially those in English constitutional history, in mediæval history, and in American colonial history, which, in certain cases, graduate students will be asked to take.

A large part of the work of the graduate student will consist of individual research and investigation carried on under the personal supervision of the professor in charge. To insure such supervision two seminaries have been organized primarily for graduates. The work of these seminaries has been so arranged that the same student may remain a member of the seminary for two or more years. In the library building are seminary rooms in which graduate students may carry on their work. In these rooms is shelved the Hagerman collection of books on history and political science, including many works to which the student has frequent occasion to refer. As occasion requires, books in special lines are placed in the seminary rooms for the use of advanced students, and everything is done to make the library serve the purpose of research.

## Professor HUDSON:—

## The History of Europe since 1789.

A course given in the *first semester* upon the history of Europe since 1789, prepares the way for a course in the *second semester* dealing with the present problems of European politics, in which a study is made of the relation of the Powers as they are affected by Asiatic and African problems and by the decay of the Turkish Empire.—*Three hours a week.*

## Seminary.

In the *first semester* a study is made of the partition of Africa among the European Powers. The subject for the *second semester* is the problems raised by the decay of China and the advance of Russia in the far east.—*Three hours a week.*

## Professor McLAUGHLIN:—

## The Political and Constitutional History of the United States, 1776–1861.

The purpose of this course is the careful study of the origin of the Constitution, its interpretation in history, the development of our political system, and the growth and tendencies of political parties. The work is based upon lectures and the careful examination of prescribed texts. The student is expected also to read in the library and to form a wide acquaintance with the secondary, and with some of the primary, authorities. Weekly reports on the reading are required. Those who have not had a thorough course in colonial history will find it desirable to take undergraduate Course 13 (University Calendar for 1898–99, page 80) in connection with this course.—*Three times a week, throughout the year.*

## Seminary in American History.

The aim of the seminary is to guide and direct the student in the use of primary authorities and to give instruction in methods of research. Special subjects of investigation are assigned to members of the seminary, and regular reports are made. Students at work upon theses are expected to report difficulties and successes, and are guided in their work. During a portion of the year the more important constitutional questions of the rebellion and the period of reconstruction are discussed, and there is an examination of the leading documents of this period.—*Two hours a week, throughout the year.*



## Constitutional Law and Political Institutions of the United States.

In this course there is a consideration of the Constitution as it has been interpreted by the courts, and a study of the political system as it appears in action. Graduate students electing this work are expected to read important texts, to examine leading cases, and to report on problems in politics and administration.—*Three times a week, for one semester.*

In addition to following the three courses just described, graduate students meet periodically to make reports on current literature, to discuss new books, and to examine important political questions or decisions of the courts.

Mr. Dow:—

## Studies in the History of France from the Tenth to the Sixteenth Century.

In the *first semester* this course deals chiefly with institutions in France during the feudal period. In the *second semester* special attention is given to changes which took place in the fourteenth and fifteenth centuries.—*Three hours a week.*

Mr. ABBOTT:—

## English History.

An advanced course in English Constitutional History is given in each semester. The course in the *first semester* deals with the period preceding the reign of Edward I, and is based mainly on Stubbs's Select Charters. In the *second semester* the course deals with the struggle between the Stuart kings and Parliament, and is based on Gardiner's Constitutional Documents.—*Two hours a week.*

## PHILOSOPHY.

The advanced courses described below and marked with an asterisk (\*) presuppose instruction in logic, ethics, and general psychology; also a general introduction to philosophy, and a somewhat extended study of the history of philosophy, ancient, mediæval, and modern. Candidates for a higher degree who have not had a preparation equivalent to this are expected to take certain of the lower courses, either before entering upon, or in connection with, their graduate work. Advanced courses bearing upon the history of philosophy are also given in the departments of Greek, Latin, French, and German. The courses in mathematics are strongly recommended for students specializing in philosophy.

## A. HISTORY OF PHILOSOPHY.

Professor WENLEY and Dr. TOWER:—

\*The Philosophy of Kant.

Lectures, and study of the Critique of Pure Reason.—*Two hours a week, first semester.*

\*The Philosophy of Hegel.

Study of the Logic and discussions.—*One hour a week, second semester.*

Assistant Professor LLOYD:—

The History of Philosophy.

A general outline of the subject from Thales to the present century. The course is designed to state the development of philosophical problems and concepts, and thus to give the student his bearings in philosophy. It is therefore highly advisable, if this course has not been taken before beginning graduate work, that it be taken at once upon beginning it.—*Three hours a week, throughout the year.*

\*Philosophy Since Hegel.

The object of this course is to introduce the student to the methods of investigation and discussion in the subject. Lectures; detailed study of Lotze, the Pessimists, etc.—*Two hours a week, second semester.*

Philosophy of History.

Lectures and study of special periods.—*Two hours a week, first semester.*

Dr. REBEC:—

Philosophy in America.

Lectures, and reading of Edwards, the Transcendentalists, etc.—*Two hours a week, first semester.*

\*Plato's Republic.

Collateral reading and theses.—*Two hours a week, first semester.*

Dr. TOWER:—

The First Period of Modern European Philosophy.

Lectures; assigned reading of Descartes, Spinoza, and Leibnitz.—*Two hours a week, first semester.*

## B. ETHICS.

Professor WENLEY:—

The Development of Ethical Ideas.

A historical review of mediæval ethics; the Renaissance and Reformation; individualism; the French Revolution and Declaration of Independence; Socialism.—*Two hours a week, first semester.*

Metaphysic of Ethics.

Lectures on the metaphysical implications of ethical theory.—*Two hours a week, second semester.*

Assistant Professor LLOYD:—

Systematic Ethics.

Lectures on ethical theory. Application of psychology to a theory of conduct.—*Two hours a week, second semester.*

Dr. REBEC:—

\*Aristotle's Ethics.

Collateral reading and theses.—*Two hours a week, second semester.*

Dr. TOWER:—

\*Special Work in Ethics. Modern Problems.

*One hour a week, second semester.*

## C. PSYCHOLOGY.

The Psychological Laboratory is well equipped for original investigation.

Dr. PILLSBURY:—

Beginners' Course in Experimental Psychology.

*Three hours a week, each semester.*

Second Course in Experimental Psychology.

*Three hours a week, second semester.*

\*Research Course in Experimental Psychology.

*Six hours a week, throughout the year.*

Genetic Psychology.

*Two hours a week, first semester.*

Systematic Psychology.

*Two hours a week, second semester.*

Dr. TOWER:—

**General Psychology.**

Psychological theories, and the relation of Psychology to Metaphysics and Epistemology.—*Two hours a week, second semester.*

**D. SPECIAL COURSES.**

Professor WENLEY:—

**Movements of Thought in the Nineteenth Century.**

A study of the metaphysical implications of modern thought. Lectures, reading, thesis.—*Two hours a week, second semester.*

**Philosophy of Religion.**

*Two hours a week, first semester.*

Assistant Professor LLOYD:—

**Metaphysics—a Criticism of some Current Scientific Ideas.**

Lectures, reading, reports.—*Two hours a week, first semester.*

**Political Philosophy.**

A critical study of society, of sovereignty, rights, duty, and of the idea of the social organism.—*Two hours a week, second semester.*

Dr. REBEC:—

**Æsthetics.**

A historical review of leading theories and their connection with philosophical systems. Bosanquet's History of Æsthetics will serve as a basis of study.—*Two hours a week, first semester.*

**Special Æsthetics.**

Relation of philosophy to interpretation of poetry.—*Two hours a week, second semester.*

**E. GRADUATE SEMINARY.**

The Library of George S. Morris, late Professor of Philosophy in the University, has been given to the Philosophical Department. It contains about 1100 volumes, covering the entire field of philosophical inquiry. They have been removed to the Morris Seminary Room and are reserved for the exclusive use of graduates and special students in Philosophy.

Professor WENLEY, Assistant Professor LLOYD, Drs. REBEC, PILLSBURY, and TOWER:—

### Graduate Seminary.

The assignment of subjects is as follows: Professor WENLEY, Metaphysics, Ethics, and Ancient Philosophy; Assistant Professor LLOYD, History of Philosophy and Ethics; Dr. REBEC, Logic, Æsthetics, and Ancient Philosophy; Dr. PILLSBURY, General and Experimental Psychology; Dr. TOWER, History of Philosophy, Metaphysics, and Epistemology.

NOTE.—Fortnightly meeting of graduate students, *first semester*; special lecture courses for all graduate students, by Professor WENLEY, *second semester*.

### THE SCIENCE AND THE ART OF TEACHING.

The objects sought in this department, as they are defined in the Calendar of the University for 1898–99, page 84, are partly practical and partly scientific. The one end is gained in preparing teachers professionally for teachers, the other, in promoting the study of teaching as a division of human knowledge. In the Graduate School more stress is laid upon the scientific phase of the subject than in undergraduate work.

Qualifications for admission to graduate work may be dealt with under two heads.

1. General Education.—When teaching is studied as science, art, or history it becomes reflective; that is, it takes account of its own principles, methods, and development. Manifestly, a student cannot pursue pedagogical studies with profit unless he has an education broad enough to furnish him with a basis upon which to build. More than this, the fundamental ideas of teaching as a study are furnished by other studies. Pedagogy is a mixed science, having its presuppositions in other sciences. While a student who has taken any one of the purely literary degrees given by the University should be able to carry on this subject with advantage, the best work calls for an elementary acquaintance, at least, with physiology, psychology, logic, ethics, and æsthetics, for these are the sciences in which the presuppositions of pedagogy are found.

2. Special Preparation.—In this respect the department differs somewhat from most others. It cannot, under existing conditions, require previous study of the science, art, or history of education, because teaching, in only rare instances, is a subject of undergraduate instruction. Some candidates for the Graduate School have had such training; others have not. It is desirable that all who intend to pursue the subject in the School should have given some attention to it. A practical acquaint-

ance with teaching as a teacher, principal, or supervisor is helpful; and so is a general knowledge of education and teaching derived from observation and reading current literature or standard works. It is desirable also that graduate students shall not find it necessary to take the most elementary work given in the department.

In respect to courses a few words must suffice. The theoretical and historical courses, and the courses in school supervision and in the comparative study of school systems, are all suitable for graduate students. If the courses as ordinarily pursued are not found adequate, they are re-enforced by outside reading. No graduate courses, so-called, are offered. Students who have taken courses in normal schools, or even in colleges, bearing the same names as those laid down in the Announcement and Calendar need have no fear of finding work they have already done merely duplicated. These courses are more extensive and thorough. For example, Compayré's History of Pedagogy is prescribed as a text-book, but is prescribed mainly to mark out, in a general way, a field that is cultivated much more broadly and deeply than it is cultivated by the author of the book.

#### Professor HINSDALE:—

##### Theoretical and Critical.

The principles underlying the arts of teaching and school management expounded. Lectures and reading.—*Four hours a week, second semester.*

##### School Supervision.

Embracing general school management, the art of grading and arranging courses of study, classifying pupils, examinations and promotions, conduct of teachers' meetings and institutes, etc. Recitations and lectures.—*Three hours a week, first semester.*

##### History of Education; ancient and mediæval.

Recitations and lectures. Text-book: Compayré's History of Pedagogy. The subjects treated in the lectures given in this course are oriental, Greek, and Roman education, and the rise and early development of Christian schools.—*Three hours a week, first semester.*

##### History of Education: modern.

Recitations and lectures. Text-book: Compayré's History of Pedagogy. The topics dealt with in this course of lectures are the movements of modern educational thought and practice.—*Three hours a week, second semester.*

## The Comparative Study of Contemporary Educational Systems: domestic and foreign.

Besides a general survey of the institutional organization of education in the United States, similar surveys are made of several foreign countries, as Germany, Italy, France, and England. Lectures.—*Two hours a week, second semester.*

## History of Educational Thought.

This course deals with Greek and Roman Antiquity and the Middle Ages, and with the more prominent of the great movements of thought in modern times. Lectures with reading. The following books mark out in a general way the track of the course: Davidson's Aristotle and Ancient Educational Ideals; West's Alcuin and the Rise of Christian Schools; and Browning's Educational Theories.—*One hour a week, second semester.*

### POLITICAL ECONOMY AND SOCIOLOGY.

The strictly undergraduate courses in political economy represent the work of at least one academic year. These courses cover "Elements of Political Economy" and "Problems in Political Economy." For description see the University Calendar for 1898-99, page 86.

Of the courses enumerated below, those designated as "Intermediate Courses" are open to undergraduate as well as graduate students, but special instruction will be afforded all graduate students in connection with these courses, this special instruction being devoted to a more careful analysis and a more extended discussion than is possible in the lectures. The courses designated as "Graduate Courses" are open only to graduate students, or to undergraduates making a specialty of political economy in their senior year.

#### A. INTERMEDIATE COURSES.

Professor ADAMS:—

### History of the Development of Industrial Society.

This course embraces a history of English industrial society from the twelfth century to the present time, and is designed to show how modern industrial customs and rights came into existence. As classified in the curriculum of the University of Michigan, it is regarded as introductory to all courses in political economy, and is usually taken before a study of the "Elements." It is inserted here because all advanced students do special reading upon industrial history.—*Two hours a week, second semester.*



### Transportation Problems.

This course traces the history of transportation as an industry, shows the social, industrial, and political results of modern methods of transportation, presents an analysis of the railway problem, and discusses the various solutions proposed.—*Two hours a week, second semester.*

### Seminary in Political Economy.

It is the purpose of instruction by the seminary method to familiarize the student with independent investigation. It is not possible to advertise the topics studied until after consultation with the students who elect the course; but in lieu of this may be submitted a description of the work done during the past academic year.

*First Semester.*—The subject chosen for investigation was Foreign Commercial Relations in Theory and in Practice. It involved a study of secondary authorities, of the mercantile system in its relation to commerce, the physiocratic and free-trade theory of commerce, the List theory of industrial evolution, the American system of protection, and, finally, the commercial and industrial development which underlies existing commercial regulations in the United States. To this was added a study from original sources of the commercial needs and possibilities of the United States.

*Second Semester.*—The general subject selected for investigation was Labor and Industry in their Relation to Law. The purpose of this semester's study was to discover the attitude of the Courts towards the acts of Legislatures designed for the amelioration or the protection of labor and for the control or curtailment of monopolies. It is probable that these topics will be repeated during the academic year 1899-1900.

Professor F. M. TAYLOR:—

### History of Political Economy.

This course consists of assigned readings in political economy in connection with a study of Ingram's History of Political Economy. It is important that students who desire to specialize in economics should take this course.

### Principles of the Science of Finance.

Under the science of finance will be included a discussion of principles of public expenditure, public revenue, budgetary legislation, financial administration, public industries, and public debts.—*Two hours a week, second semester.*



### Money and Banking.

A mixed text-book and lecture course. The class will be examined in Jevons's *Money and the Mechanism of Exchange*, White's *Money and Banking*, and Dunbar's *Theory and History of Banking*, as well as upon lectures. Current monetary problems will receive special attention.—*Two hours a week, first semester.*

### Socialism, including Communism, Collectivism, Land Nationalism, State Socialism, etc.

*Two hours a week, second semester.*

Dr. COOLEY:—

### Theory and Practice of Statistics.

Lectures and practical exercises.—*One hour a week, first semester.*

### Special Studies in Statistics.

*Two hours a week, second semester.*

### Principles of Sociology.

Lectures. This course aims at a systematic and comprehensive study of the underlying principles of social science. These principles are verified and illustrated by an examination of existing society.—*Three lectures a week, first semester.*

### Problems in Sociology.

This course embraces a study of the laws of population, the treatment of criminals, poor relief, the assimilation of immigrants, the development of great cities, and other sociological questions of present importance.—*Three lectures a week, second semester.*

### Historical Development of Sociological Thought.

*Two hours a week, first semester.*

### Psychological Sociology.

*Two hours a week, second semester.*

## B. GRADUATE COURSES.

The strictly advanced instruction in economics and sociology is carried on partly by lectures, partly by assigned readings and reports, and partly by formal seminars designed to give practice in research. So far as lectures are concerned, it is organized as a solid course of two hours a week for three consecutive years. The course is given jointly by Professor ADAMS, Professor F. M. TAYLOR, and Dr. COOLEY, each

instructor in turn claiming the attention of students for about one third of each semester. The subjects of instruction are indicated below.

Since the chief aim of advanced instruction is to familiarize students with the processes of critical analysis, the particular topics investigated during any semester are relatively unimportant. In view, however, of the fact that the more advanced degree conferred by the University calls for three years of study, it seems desirable that the special topics should be changed each year for a series of three years. As a result of this arrangement candidates for a bachelor's degree (who are adequately prepared) are provided with one year, candidates for a master's degree with two years, and candidates for a doctor's degree with three years of specialized instruction. It will be noticed from the analysis given below that the topics covered in this specialized course have been somewhat cursorily treated in the "intermediate" or general University courses.

Professor ADAMS:—

Development and Significance of English Political Economy.

*Two hours a week, for six weeks, first semester.*

[Comparative Study of Fiscal Institutions.

*Two hours a week, for six weeks, second semester.* This course is omitted in 1899-1900.]

[Development and Significance of the Historical School of Economics.

*Two hours a week, for six weeks, first semester.* This course is omitted in 1899-1900].

[Labor Organizations and Corporations as Factors in Industrial Organization.

*Two hours a week for six weeks, second semester.* This course is omitted in 1899-1900.]

[Development and Significance of the Austrian School of Economics.

*Two hours a week, for six weeks, first semester.* This course is omitted in 1899-1900.]

Relation of the State to Industrial Action.

*Two hours a week, for six weeks, second semester.*

Professor F. M. TAYLOR:—

The Value of Money.

Theory and Statistics.—*Two hours a week, for six weeks, first semester.* This course is omitted in 1899-1900.]

Social Philosophy, with Especial Reference to Economic Problems.

*Two hours a week, for six weeks, first semester.*

[The Agricultural Problem.

Treated from the comparative point of view.—*Two hours a week, for six weeks, second semester.* This course is omitted in 1899-1900.]

[Paper Money.

Government *versus* bank notes. Methods of regulation.—*Ten lectures, first semester.* This course is omitted in 1899-1900.]

Capital and Interest, their Nature and Origin.

Different theories historically and critically examined.—*Ten lectures, second semester.*

[Credit as a Factor in Production.

The modern institutions of credit historically and theoretically considered.—*Two hours a week, for six weeks, second semester.* This course is omitted in 1899-1900.]

Dr. COOLEY:

The Principles of Association.

*Three hours a week, for six weeks, first semester.* This course will be omitted in 1900-2.

Competition.

*Three hours a week, for six weeks, second semester.* This course will be omitted in 1900-2.

[The Laws of Population.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1899-1900, but may be expected in 1900-1901.]

[Current Changes in the Social Organization of the United States.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1899-1900, but may be expected in 1900-1.]

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[Historical Development of Sociological Thought.

*Three hours a week, for six weeks, first semester. This course is omitted in 1899-1900, but may be expected in 1901-2.]*

[Social Psychology.

*Three hours a week, for six weeks, second semester. This course is omitted in 1899-1900, but may be expected in 1901-2.]*

**INTERNATIONAL LAW.**

The courses in international law presupposes a general acquaintance with modern European history.

President ANGELL:—

Lectures on International Law.

*Two hours a week, first semester.*

History of Treaties.

*Two hours a week, second semester.*

**MATHEMATICS.**

The courses mentioned below presuppose the usual preparatory course in algebra and elementary geometry, plane, solid, and spherical, together with two years of collegiate study devoted to trigonometry, higher algebra, plane analytic geometry, and differential and integral calculus.

In addition to the courses announced below, advanced work in mathematical reading and research will be arranged, so far as possible, to suit the needs of individual students.

**A. FOR UNDERGRADUATES AND GRADUATES.**

Professor BEMAN:—

Solid Analytic Geometry.

Frost, with references to Salmon.—*Two hours a week, first semester.*

Differential Equations.

Johnson, with references to Forsyth, Boole, and Mansion.—*Three hours a week, first semester.*

'Teachers' Seminary.

Critical study of certain text-books in algebra and geometry, together with the discussion of methods and aims in mathematical teaching, sketches of the history of mathematics, lists of books for teachers, etc.—*Two hours a week, throughout the year.*

Professor ZIWET:—

Advanced Mechanics (I).

This course forms a direct continuation of the course in elementary mechanics; it is mainly devoted to the dynamics of a rigid body.—*Three hours a week, second semester.*

Assistant Professor MARKLEY:—

Projective Geometry.

*Three hours a week, throughout the year.*

Dr. GLOVER:—

Higher Algebra.

The more important topics to be considered in this course are: symmetric functions of the roots; resultants; solution of a system of  $n$  linear equations; theorems concerning integral functions of one and two variables; correspondence; linear transformation; invariants and covariants; symbolic forms.—*Three hours a week, throughout the year.*

B. PRIMARILY FOR GRADUATES.

Professor BEMAN:—

Advanced Differential and Integral Calculus.

Jordan's Cours d' Analyse.—*Two hours a week, throughout the year.*

Higher Plane Curves.

Salmon, with references to Clebsch.—*Two hours a week, second semester.*

Linear Differential Equations.

*Two hours a week, second semester.*

Professor ZIWET:—

Advanced Mechanics (II).

This course forms an introduction to mathematical physics; it is devoted to the theory of the potential and some of its applications to hydrodynamics, electricity, etc.—*Two hours a week, first semester.*

Partial Differential Equations.

This course, which presupposes an elementary knowledge of ordinary differential equations and projective geometry, will be devoted mainly to partial differential equations of the first order and their application to geometry and mathematical physics.—*Two hours a week, throughout the year.*

Assistant Professor MARKLEY:—

Theory of Functions.

The aim of this course is to present the fundamental ideas of complex quantities, their geometrical representation and their calculus, and to furnish an introduction to the theories of functions of a complex variable as developed by Cauchy and Weierstrass.—*Three hours a week, throughout the year.*

Theory of Numbers.

*Two hours a week, throughout the year.*

Dr. GLOVER:—

Theory of Substitutions.

The first half of this course will be devoted to the development of the elementary notions of groups, and, in particular, to the properties of substitution groups. The second half will take up the application of the latter to the algebraic equation.—*Two hours a week, throughout the year.*

Theory of Invariants.

An introduction to the symbolic theory of invariants as developed by Aronhold, Clebsch, and Gordan.—*Two hours a week, throughout the year.*

**PHYSICS.**

The courses here announced presuppose about one and a half years' collegiate work in physics; viz., a course in mechanics, sound, light, electricity, magnetism, and heat, five hours a week, for one year; a beginners' course in laboratory work, two or three hours a week for half a year; and a course in primary and secondary batteries, two hours a week for half a year.

The courses in Mathematical Electricity, the Theory of Light, and the Theory of Heat, and the Advanced Laboratory Courses in Sound and Light, are primarily for graduates; the other courses are open to undergraduates, but they are found to be beyond the work done in many colleges.

Graduate students, who are properly qualified by their previous training, have opportunity for original research in the physical laboratory under the immediate supervision of the director and his associates.

Professor CARHART has leave of absence for 1899-1900.

Professor PATTERSON:—

Dynamo Electric Machinery.

*Three hours a week, second semester.*

### Alternate Current Apparatus.

*Three hours a week, first semester.*

### Alternate Current Phenomena: Steinmetz.

*Two hours a week, second semester.*

The three courses above named form a graded series covering the theory of dynamo-electric machines, alternate current working, transformers, and alternate current phenomena as applied to generators, distribution of power, and induction motors. Laboratory work forms a part of the first two courses.

### Mathematical Electricity.

This course is a treatment of the subject with the use of higher mathematics. Special attention is given to the Newtonian potential function, polarized distributions, electrostatics, electrokinetics, electromagnetism, and electromagnetic waves.—*Three hours a week, first semester; two hours a week, second semester.*

### Assistant Professor REED:—

#### The Theory of Sound.

Lectures and laboratory work. The lectures are based upon the works of Helmholtz and Rayleigh. The laboratory work involves acoustical and optical measurements of period, amplitude, and phase-difference of simple and compound vibrating systems; also the study of sensitive flames, organ pipes, resonators, and the application of stroboscopic methods to oscillating systems.—Lectures, *twice a week*; laboratory work, *twice a week, first semester.*

#### The Theory of Light: Preston.

The work involves a careful study of the text, with supplementary reading. The laboratory work includes measurements with the focometer, spectrometer, polarimeter, and interferometer; determination of wave-lengths by diffraction and interference methods; and a study of arc and solar spectra.—Lectures and recitations, *two hours a week*; laboratory work, *twice a week, second semester.*

#### Advanced Laboratory Work in Sound.

The work is devoted to a repetition of the classical experiments of Mach, Boltzmann, and Helmholtz; to the study of special problems; and to the application of optical methods to acoustical measurements.—*Twice a week, first semester.*

### Advanced Laboratory Work in Light.

The course includes a brief study of interference phenomena under high relative retardation; visibility curves for various spectral lines; the study of dispersion as affected by temperature; study of reflecting metallic films, with accompanying interference phenomena; and the special study of optical and electro-optical problems.—*Twice a week, second semester.*

Dr. GUTHE:—

### The Theory of Heat: Preston.

This course covers most of the text, including the chapters on thermodynamics.—*Two hours a week, first semester.*

### Laboratory Work in Heat.

This course comprises determinations of specific heat of solids and liquids; heat of fusion and of vaporization; the coefficient of expansion of solids, liquids, and gases; also experiments on the constants of gases and vapors, such as the specific heat of gases, vapor density, vapor pressure, etc.; also the determination of the mechanical equivalent of heat by electrical methods.—*Twice a week, first semester.*

### Theories of Solutions and of Electrolytes.

The work includes the osmotic theory of the voltaic cell, electrolytic resistance, and the internal resistance of primary batteries.—*Three times a week, second semester.*

Dr. GUTHE and Dr. TROWBRIDGE:—

### Electrical Measurements.

This course comprises, in addition to all the refined methods of measuring resistance, current, and electromotive force, a very thorough treatment of the subjects of capacity, inductance, and magnetism.—Lectures, *one hour a week, throughout the year*; laboratory work, *two or three times a week, first semester; twice a week, second semester.*

### GENERAL CHEMISTRY.

To be received as a candidate for a higher degree with chemistry as a major subject, the preparation must include the branches of general, analytical, and organic chemistry. The extent of work in these branches must have been equivalent in substance to the following named undergraduate courses in this University (University Calendar for 1898–99, pages 91 to 95): Course 2 or 5 in general chemistry, and Courses 1, (equivalent to Course 3 in general chemistry together with Course 3a in



analytical chemistry), 4, and 10 in analytical and organic chemistry,—making in all about twenty-seven hours of undergraduate credit.\* If chemistry be taken as a minor subject in work registered for a higher degree, preparation must have been made equivalent at least to undergraduate Courses 2 and 5 in general chemistry.

Candidates for a doctor's degree, in addition to the requirements above specified, must have satisfied the committee in charge of their studies as to their fitness to enter upon the higher work. A reading knowledge of German and French is necessary.

Graduate students who are not in work for a degree, and those who are preparing for registration as candidates for higher degrees according to the requirements above stated, will be directed in such chemical studies as they require.

A very complete chemical library, with a full set of journals in demand for research, and with current literature in all branches of chemistry, is provided in the University General Library. A reading room in the Chemical Laboratory furnishes duplicates of the full sets most used, as well as duplicates of the chief compilations.

Professor Freer:—

### Historical Chemistry.

Lectures and historical reading, covering the history of the science from the beginning to 1860.—*Two hours a week, first semester.*

### Chemical Literature; Journal Club.

The Journal Club discusses current chemical literature. It is under the direction of Professor FREER, but all the instructors and assistants in the department of general chemistry take part therein. All of the prominent Journals are divided among the participants, who report on the most interesting topics in rotation.—*One hour to one and one-half hours a week, throughout the year.*

### Laboratory Research.

The work may be either organic or inorganic, and the student is at liberty to select one from a number of topics proposed. The work includes the study of the literature bearing upon the topics. In order to accomplish results the student should have at least five clear half days a week to devote to the work. This statement applies to all research courses.—*Hours arranged with instructor, throughout the year.*

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\* An "hour of credit" implies the satisfactory completion of work equivalent to one exercise a week during one semester.

Mr. HIGLEY:—

Laboratory Work in Selected Topics of Inorganic Chemistry, including Inorganic Preparations.

This work is preparatory to research, and also includes a training in preparing demonstrations proper for use in teaching.—*Hours arranged with instructor, throughout the year.*

Laboratory Research in Inorganic Chemistry.

*Hours arranged with instructor, throughout the year.*

Mr. LICHTY:—

Laboratory Work with the Polariscope and the Spectroscope.

This course includes the theory of the instruments, their practical applications, and the study of stereochemical questions involved.—*Hours arranged with instructor, second semester.*

Laboratory Research.

Inorganic Chemistry.—*Hours arranged with instructor, throughout the year.*

Dr. SHERMAN:—

Laboratory Work in Selected Topics of Chemistry.

*Hours arranged with instructor, throughout the year.*

Laboratory Research.

Organic or Inorganic Chemistry.—*Hours arranged with instructor.*

Dr. BIGELOW:—

Physical and Theoretical Chemistry.

This course is intended to cover, in an elementary manner, all of the chief topics of modern theoretical and physical chemistry. It is preliminary to, or it should accompany, laboratory work. Lectures.—*Three hours a week, either semester.*

Laboratory Work in Physical Chemistry.

This course covers, as much as possible, the ground outlined in the lectures. It includes the standard methods of determining molecular weights, the theories of solution, dissociation, etc. It is essential for all who wish to become acquainted with modern chemistry.—*Hours arranged with instructor.*

**Laboratory Research.**

Physical Chemistry.—*Hours arranged with instructor.*

**ANALYTICAL CHEMISTRY AND ORGANIC CHEMISTRY.**

Professors PRESCOTT and CAMPBELL, Dr. GOMBERG, and Mr. WHITE:—

**Seminary in Recent Research.**

Library work upon chosen questions in pure and applied chemistry, discussions in the seminary, and the writing of reviews. A subject is assigned to each student, who reads in the journals by direction, and reports the literature for discussion, preparatory to the writing of his review. A record of all the work of the seminary is made by each member for himself.—*Two hours a week, throughout the year.*

Professor JOHNSON:—

**Qualitative Analytical Chemistry.**

Following undergraduate Course 1 (University Calendar for 1898-99, page 94) or its equivalent. Laboratory work and lectures.—*Lectures twice a week, second semester; laboratory work, hours arranged with instructor.*

Professor JOHNSON and Mr. TROWBRIDGE:—

**Investigation of Inorganic Reactions.**

Laboratory and library research.—*Hours arranged with instructors, throughout the year.*

Professor CAMPBELL:—

**Quantitative Analytical Chemistry.**

To follow undergraduate Course 4 (University Calendar for 1898-99, page 94) or its equivalent. Laboratory work directed by lectures in any of three courses, namely: (1) Advanced quantitative methods in general, (2) the analysis of minerals, (3) iron and steel analysis. Electrolytic methods are much employed and there is a room devoted to their use.—*Hours arranged with instructor, throughout the year.*

**Investigation in Analytical Method, Inorganic Structure, and Metallurgical Chemistry.**

Laboratory work upon questions related to researches published from this department. Use is made of Le Chatelier's pyrometer, as well as of calorimetric methods in study of heats of formation. Special work is given in micrometallography, as bearing upon the constitution of metals and their alloys.—*Hours arranged with instructor, throughout the year.*

## Professor HUDSON:—

## The History of Europe since 1789.

A course given in the *first semester* upon the history of Europe since 1789, prepares the way for a course in the *second semester* dealing with the present problems of European politics, in which a study is made of the relation of the Powers as they are affected by Asiatic and African problems and by the decay of the Turkish Empire.—*Three hours a week.*

## Seminary.

In the *first semester* a study is made of the partition of Africa among the European Powers. The subject for the *second semester* is the problems raised by the decay of China and the advance of Russia in the far east.—*Three hours a week.*

## Professor McLAUGHLIN:—

## The Political and Constitutional History of the United States, 1776–1861.

The purpose of this course is the careful study of the origin of the Constitution, its interpretation in history, the development of our political system, and the growth and tendencies of political parties. The work is based upon lectures and the careful examination of prescribed texts. The student is expected also to read in the library and to form a wide acquaintance with the secondary, and with some of the primary, authorities. Weekly reports on the reading are required. Those who have not had a thorough course in colonial history will find it desirable to take undergraduate Course 13 (University Calendar for 1898–99, page 80) in connection with this course.—*Three times a week, throughout the year.*

## Seminary in American History.

The aim of the seminary is to guide and direct the student in the use of primary authorities and to give instruction in methods of research. Special subjects of investigation are assigned to members of the seminary, and regular reports are made. Students at work upon theses are expected to report difficulties and successes, and are guided in their work. During a portion of the year the more important constitutional questions of the rebellion and the period of reconstruction are discussed, and there is an examination of the leading documents of this period.—*Two hours a week, throughout the year.*

### Investigation in Organic Chemistry.

Laboratory work upon subjects related to publications from this laboratory.—*Hours arranged with instructor, throughout the year.*

Professor PRESCOTT:—

### Lectures on Organic Chemistry.

A beginning course.—*Five times a week, in either first or second semester.*

### Investigation in Organic or in Analytical Chemistry.

Laboratory and library research upon subjects selected.

### **BACTERIOLOGY, HYGIENE, PHYSIOLOGICAL CHEMISTRY.**

The courses here announced presuppose that the student taking them is prepared for original research.

Professor VAUGHAN:—

### Original Research on the Causation of Disease.

*Hours arranged with instructor, either first or second semester.*

Professor NOVY:—

### Special Methods in Bacteriology.

A course in advanced laboratory work in bacteriology. It deals with the preparation and use of Pasteur pipettes, the drawing of blood, the collection and sterilization of serum, the filtration of bacterial liquids, the preparation of tuberculin, tetanus, and diphtheria toxins, the preparation of antitoxic and anti-infectious sera, serum agglutination, the determination of the thermal death-point, of the action of antiseptics and disinfectants, the detection of bacteria in sections, the collodium sac method, inoculation for rabies, etc. The student, when qualified, is assigned special problems for investigation and research.

The course must be preceded by Courses 2 and 3, described in the University Calendar for 1898-99, page 97.—*Hours arranged with instructor, either first or second semester.*

### Advanced Physiological Chemistry.

Laboratory work and reading.—*Hours arranged with instructor, either first or second semester.*

### Methods of Hygiene.

Chemical and bacteriological examination of water, air, soil, milk, butter, etc.—*Hours arranged with instructor, either first or second semester.*

[Historical Development of Sociological Thought.

*Three hours a week, for six weeks, first semester.* This course is omitted in 1899-1900, but may be expected in 1901-2.]

[Social Psychology.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1899-1900, but may be expected in 1901-2.]

**INTERNATIONAL LAW.**

The courses in international law presupposes a general acquaintance with modern European history.

President ANGELL:—

Lectures on International Law.

*Two hours a week, first semester.*

History of Treaties.

*Two hours a week, second semester.*

**MATHEMATICS.**

The courses mentioned below presuppose the usual preparatory course in algebra and elementary geometry, plane, solid, and spherical, together with two years of collegiate study devoted to trigonometry, higher algebra, plane analytic geometry, and differential and integral calculus.

In addition to the courses announced below, advanced work in mathematical reading and research will be arranged, so far as possible, to suit the needs of individual students.

**A. FOR UNDERGRADUATES AND GRADUATES.**

Professor BEMAN:—

Solid Analytic Geometry.

Frost, with references to Salmon.—*Two hours a week, first semester.*

Differential Equations.

Johnson, with references to Forsyth, Boole, and Mansion.—*Three hours a week, first semester.*

Teachers' Seminary.

Critical study of certain text-books in algebra and geometry, together with the discussion of methods and aims in mathematical teaching, sketches of the history of mathematics, lists of books for teachers, etc.—*Two hours a week, throughout the year.*

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Professor ZIWET:—

Advanced Mechanics (I).

This course forms a direct continuation of the course in elementary mechanics; it is mainly devoted to the dynamics of a rigid body.—*Three hours a week, second semester.*

Assistant Professor MARKLEY:—

Projective Geometry.

*Three hours a week, throughout the year.*

Dr. GLOVER:—

Higher Algebra.

The more important topics to be considered in this course are: symmetric functions of the roots; resultants; solution of a system of  $n$  linear equations; theorems concerning integral functions of one and two variables; correspondence; linear transformation; invariants and covariants; symbolic forms.—*Three hours a week, throughout the year.*

B. PRIMARILY FOR GRADUATES.

Professor BEMAN:—

Advanced Differential and Integral Calculus.

Jordan's Cours d' Analyse.—*Two hours a week, throughout the year.*

Higher Plane Curves.

Salmon, with references to Clebsch.—*Two hours a week, second semester.*

Linear Differential Equations.

*Two hours a week, second semester.*

Professor ZIWET:—

Advanced Mechanics (II).

This course forms an introduction to mathematical physics; it is devoted to the theory of the potential and some of its applications to hydrodynamics, electricity, etc.—*Two hours a week, first semester.*

Partial Differential Equations.

This course, which presupposes an elementary knowledge of ordinary differential equations and projective geometry, will be devoted mainly to partial differential equations of the first order and their application to geometry and mathematical physics.—*Two hours a week, throughout the year.*

Assistant Professor MARKLEY:—

### Theory of Functions.

The aim of this course is to present the fundamental ideas of complex quantities, their geometrical representation and their calculus, and to furnish an introduction to the theories of functions of a complex variable as developed by Cauchy and Weierstrass.—*Three hours a week, throughout the year.*

### Theory of Numbers.

*Two hours a week, throughout the year.*

Dr. GLOVER:—

### Theory of Substitutions.

The first half of this course will be devoted to the development of the elementary notions of groups, and, in particular, to the properties of substitution groups. The second half will take up the application of the latter to the algebraic equation.—*Two hours a week, throughout the year.*

### Theory of Invariants.

An introduction to the symbolic theory of invariants as developed by Aronhold, Clebsch, and Gordan.—*Two hours a week, throughout the year.*

## PHYSICS.

The courses here announced presuppose about one and a half years' collegiate work in physics; viz., a course in mechanics, sound, light, electricity, magnetism, and heat, five hours a week, for one year; a beginners' course in laboratory work, two or three hours a week for half a year; and a course in primary and secondary batteries, two hours a week for half a year.

The courses in Mathematical Electricity, the Theory of Light, and the Theory of Heat, and the Advanced Laboratory Courses in Sound and Light, are primarily for graduates; the other courses are open to undergraduates, but they are found to be beyond the work done in many colleges.

Graduate students, who are properly qualified by their previous training, have opportunity for original research in the physical laboratory under the immediate supervision of the director and his associates.

Professor CARHART has leave of absence for 1899-1900.

Professor PATTERSON:—

### Dynamo Electric Machinery.

*Three hours a week, second semester.*



### Alternate Current Apparatus.

*Three hours a week, first semester.*

### Alternate Current Phenomena: Steinmetz.

*Two hours a week, second semester.*

The three courses above named form a graded series covering the theory of dynamo-electric machines, alternate current working, transformers, and alternate current phenomena as applied to generators, distribution of power, and induction motors. Laboratory work forms a part of the first two courses.

### Mathematical Electricity.

This course is a treatment of the subject with the use of higher mathematics. Special attention is given to the Newtonian potential function, polarized distributions, electrostatics, electrokinetics, electromagnetism, and electromagnetic waves.—*Three hours a week, first semester; two hours a week, second semester.*

### Assistant Professor REED:—

#### The Theory of Sound.

Lectures and laboratory work. The lectures are based upon the works of Helmholtz and Rayleigh. The laboratory work involves acoustical and optical measurements of period, amplitude, and phase-difference of simple and compound vibrating systems; also the study of sensitive flames, organ pipes, resonators, and the application of stroboscopic methods to oscillating systems.—Lectures, *twice a week*; laboratory work, *twice a week, first semester.*

#### The Theory of Light: Preston.

The work involves a careful study of the text, with supplementary reading. The laboratory work includes measurements with the focometer, spectrometer, polarimeter, and interferometer; determination of wave-lengths by diffraction and interference methods; and a study of arc and solar spectra.—Lectures and recitations, *two hours a week*; laboratory work, *twice a week, second semester.*

#### Advanced Laboratory Work in Sound.

The work is devoted to a repetition of the classical experiments of Mach, Boltzmann, and Helmholtz; to the study of special problems; and to the application of optical methods to acoustical measurements.—*Twice a week, first semester.*

ance with teaching as a teacher, principal, or supervisor is helpful; and so is a general knowledge of education and teaching derived from observation and reading current literature or standard works. It is desirable also that graduate students shall not find it necessary to take the most elementary work given in the department.

In respect to courses a few words must suffice. The theoretical and historical courses, and the courses in school supervision and in the comparative study of school systems, are all suitable for graduate students. If the courses as ordinarily pursued are not found adequate, they are re-enforced by outside reading. No graduate courses, so-called, are offered. Students who have taken courses in normal schools, or even in colleges, bearing the same names as those laid down in the Announcement and Calendar need have no fear of finding work they have already done merely duplicated. These courses are more extensive and thorough. For example, Compayré's History of Pedagogy is prescribed as a text-book, but is prescribed mainly to mark out, in a general way, a field that is cultivated much more broadly and deeply than it is cultivated by the author of the book.

#### Professor HINSDALE:—

##### Theoretical and Critical.

The principles underlying the arts of teaching and school management expounded. Lectures and reading.—*Four hours a week, second semester.*

##### School Supervision.

Embracing general school management, the art of grading and arranging courses of study, classifying pupils, examinations and promotions, conduct of teachers' meetings and institutes, etc. Recitations and lectures.—*Three hours a week, first semester.*

##### History of Education; ancient and mediæval.

Recitations and lectures. Text-book: Compayré's History of Pedagogy. The subjects treated in the lectures given in this course are oriental, Greek, and Roman education, and the rise and early development of Christian schools.—*Three hours a week, first semester.*

##### History of Education: modern.

Recitations and lectures. Text-book: Compayré's History of Pedagogy. The topics dealt with in this course of lectures are the movements of modern educational thought and practice.—*Three hours a week, second semester.*

## The Comparative Study of Contemporary Educational Systems: domestic and foreign.

Besides a general survey of the institutional organization of education in the United States, similar surveys are made of several foreign countries, as Germany, Italy, France, and England. Lectures.—*Two hours a week, second semester.*

## History of Educational Thought.

This course deals with Greek and Roman Antiquity and the Middle Ages, and with the more prominent of the great movements of thought in modern times. Lectures with reading. The following books mark out in a general way the track of the course: Davidson's Aristotle and Ancient Educational Ideals; West's Alcuin and the Rise of Christian Schools; and Browning's Educational Theories.—*One hour a week, second semester.*

### POLITICAL ECONOMY AND SOCIOLOGY.

The strictly undergraduate courses in political economy represent the work of at least one academic year. These courses cover "Elements of Political Economy" and "Problems in Political Economy." For description see the University Calendar for 1898-99, page 86.

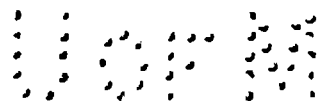
Of the courses enumerated below, those designated as "Intermediate Courses" are open to undergraduate as well as graduate students, but special instruction will be afforded all graduate students in connection with these courses, this special instruction being devoted to a more careful analysis and a more extended discussion than is possible in the lectures. The courses designated as "Graduate Courses" are open only to graduate students, or to undergraduates making a specialty of political economy in their senior year.

#### A. INTERMEDIATE COURSES.

Professor ADAMS:—

### History of the Development of Industrial Society.

This course embraces a history of English industrial society from the twelfth century to the present time, and is designed to show how modern industrial customs and rights came into existence. As classified in the curriculum of the University of Michigan, it is regarded as introductory to all courses in political economy, and is usually taken before a study of the "Elements." It is inserted here because all advanced students do special reading upon industrial history.—*Two hours a week, second semester.*



### Transportation Problems.

This course traces the history of transportation as an industry, shows the social, industrial, and political results of modern methods of transportation, presents an analysis of the railway problem, and discusses the various solutions proposed.—*Two hours a week, second semester.*

### Seminary in Political Economy.

It is the purpose of instruction by the seminary method to familiarize the student with independent investigation. It is not possible to advertise the topics studied until after consultation with the students who elect the course; but in lieu of this may be submitted a description of the work done during the past academic year.

*First Semester.*—The subject chosen for investigation was Foreign Commercial Relations in Theory and in Practice. It involved a study of secondary authorities, of the mercantile system in its relation to commerce, the physiocratic and free-trade theory of commerce, the List theory of industrial evolution, the American system of protection, and, finally, the commercial and industrial development which underlies existing commercial regulations in the United States. To this was added a study from original sources of the commercial needs and possibilities of the United States.

*Second Semester.*—The general subject selected for investigation was Labor and Industry in their Relation to Law. The purpose of this semester's study was to discover the attitude of the Courts towards the acts of Legislatures designed for the amelioration or the protection of labor and for the control or curtailment of monopolies. It is probable that these topics will be repeated during the academic year 1899–1900.

Professor F. M. TAYLOR:—

### History of Political Economy.

This course consists of assigned readings in political economy in connection with a study of Ingram's History of Political Economy. It is important that students who desire to specialize in economics should take this course.

### Principles of the Science of Finance.

Under the science of finance will be included a discussion of principles of public expenditure, public revenue, budgetary legislation, financial administration, public industries, and public debts.—*Two hours a week, second semester.*



### Money and Banking.

A mixed text-book and lecture course. The class will be examined in Jevons's *Money and the Mechanism of Exchange*, White's *Money and Banking*, and Dunbar's *Theory and History of Banking*, as well as upon lectures. Current monetary problems will receive special attention.—*Two hours a week, first semester.*

### Socialism, including Communism, Collectivism, Land Nationalism, State Socialism, etc.

*Two hours a week, second semester.*

Dr. COOLEY:—

### Theory and Practice of Statistics.

Lectures and practical exercises.—*One hour a week, first semester.*

### Special Studies in Statistics.

*Two hours a week, second semester.*

### Principles of Sociology.

Lectures. This course aims at a systematic and comprehensive study of the underlying principles of social science. These principles are verified and illustrated by an examination of existing society.—*Three lectures a week, first semester.*

### Problems in Sociology.

This course embraces a study of the laws of population, the treatment of criminals, poor relief, the assimilation of immigrants, the development of great cities, and other sociological questions of present importance.—*Three lectures a week, second semester.*

### Historical Development of Sociological Thought.

*Two hours a week, first semester.*

### Psychological Sociology.

*Two hours a week, second semester.*

## B. GRADUATE COURSES.

The strictly advanced instruction in economics and sociology is carried on partly by lectures, partly by assigned readings and reports, and partly by formal seminars designed to give practice in research. So far as lectures are concerned, it is organized as a solid course of two hours a week for three consecutive years. The course is given jointly by Professor ADAMS, Professor F. M. TAYLOR, and Dr. COOLEY, each

instructor in turn claiming the attention of students for about one third of each semester. The subjects of instruction are indicated below.

Since the chief aim of advanced instruction is to familiarize students with the processes of critical analysis, the particular topics investigated during any semester are relatively unimportant. In view, however, of the fact that the more advanced degree conferred by the University calls for three years of study, it seems desirable that the special topics should be changed each year for a series of three years. As a result of this arrangement candidates for a bachelor's degree (who are adequately prepared) are provided with one year, candidates for a master's degree with two years, and candidates for a doctor's degree with three years of specialized instruction. It will be noticed from the analysis given below that the topics covered in this specialized course have been somewhat cursorily treated in the "intermediate" or general University courses.

Professor ADAMS:—

Development and Significance of English Political Economy.

*Two hours a week, for six weeks, first semester.*

[Comparative Study of Fiscal Institutions.

*Two hours a week, for six weeks, second semester.* This course is omitted in 1899-1900.]

[Development and Significance of the Historical School of Economics.

*Two hours a week, for six weeks, first semester.* This course is omitted in 1899-1900].

[Labor Organizations and Corporations as Factors in Industrial Organization.

*Two hours a week for six weeks, second semester.* This course is omitted in 1899-1900.]

[Development and Significance of the Austrian School of Economics.

*Two hours a week, for six weeks, first semester.* This course is omitted in 1899-1900.]

Relation of the State to Industrial Action.

*Two hours a week, for six weeks, second semester.*

Professor F. M. TAYLOR:—

The Value of Money.

Theory and Statistics.—*Two hours a week, for six weeks, first semester.* This course is omitted in 1899–1900.]

Social Philosophy, with Especial Reference to Economic Problems.

*Two hours a week, for six weeks, first semester.*

[The Agricultural Problem.

Treated from the comparative point of view.—*Two hours a week, for six weeks, second semester.* This course is omitted in 1899–1900.]

[Paper Money.

Government *versus* bank notes. Methods of regulation.—*Ten lectures, first semester.* This course is omitted in 1899–1900.]

Capital and Interest, their Nature and Origin.

Different theories historically and critically examined.—*Ten lectures, second semester.*

[Credit as a Factor in Production.

The modern institutions of credit historically and theoretically considered.—*Two hours a week, for six weeks, second semester.* This course is omitted in 1899–1900.]

Dr. COOLEY:

The Principles of Association.

*Three hours a week, for six weeks, first semester.* This course will be omitted in 1900–2.

Competition.

*Three hours a week, for six weeks, second semester.* This course will be omitted in 1900–2.

[The Laws of Population.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1899–1900, but may be expected in 1900–1901.]

[Current Changes in the Social Organization of the United States.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1899–1900, but may be expected in 1900–1.]

[Historical Development of Sociological Thought.

*Three hours a week, for six weeks, first semester.* This course is omitted in 1899-1900, but may be expected in 1901-2.]

[Social Psychology.

*Three hours a week, for six weeks, second semester.* This course is omitted in 1899-1900, but may be expected in 1901-2.]

**INTERNATIONAL LAW.**

The courses in international law presupposes a general acquaintance with modern European history.

President ANGELL:—

Lectures on International Law.

*Two hours a week, first semester.*

History of Treaties.

*Two hours a week, second semester.*

**MATHEMATICS.**

The courses mentioned below presuppose the usual preparatory course in algebra and elementary geometry, plane, solid, and spherical, together with two years of collegiate study devoted to trigonometry, higher algebra, plane analytic geometry, and differential and integral calculus.

In addition to the courses announced below, advanced work in mathematical reading and research will be arranged, so far as possible, to suit the needs of individual students.

**A. FOR UNDERGRADUATES AND GRADUATES.**

Professor BEMAN:—

Solid Analytic Geometry.

Frost, with references to Salmon.—*Two hours a week, first semester.*

Differential Equations.

Johnson, with references to Forsyth, Boole, and Mansion.—*Three hours a week, first semester.*

Teachers' Seminary.

Critical study of certain text-books in algebra and geometry, together with the discussion of methods and aims in mathematical teaching, sketches of the history of mathematics, lists of books for teachers, etc.—*Two hours a week, throughout the year.*



Professor ZIWET:—

Advanced Mechanics (I).

This course forms a direct continuation of the course in elementary mechanics; it is mainly devoted to the dynamics of a rigid body.—*Three hours a week, second semester.*

Assistant Professor MARKLEY:—

Projective Geometry.

*Three hours a week, throughout the year.*

Dr. GLOVER:—

Higher Algebra.

The more important topics to be considered in this course are: symmetric functions of the roots; resultants; solution of a system of  $n$  linear equations; theorems concerning integral functions of one and two variables; correspondence; linear transformation; invariants and covariants; symbolic forms.—*Three hours a week, throughout the year.*

B. PRIMARILY FOR GRADUATES.

Professor BEMAN:—

Advanced Differential and Integral Calculus.

Jordan's Cours d' Analyse.—*Two hours a week, throughout the year.*

Higher Plane Curves.

Salmon, with references to Clebsch.—*Two hours a week, second semester.*

Linear Differential Equations.

*Two hours a week, second semester.*

Professor ZIWET:—

Advanced Mechanics (II).

This course forms an introduction to mathematical physics; it is devoted to the theory of the potential and some of its applications to hydrodynamics, electricity, etc.—*Two hours a week, first semester.*

Partial Differential Equations.

This course, which presupposes an elementary knowledge of ordinary differential equations and projective geometry, will be devoted mainly to partial differential equations of the first order and their application to geometry and mathematical physics.—*Two hours a week, throughout the year.*

Assistant Professor MARKLEY:—

Theory of Functions.

The aim of this course is to present the fundamental ideas of complex quantities, their geometrical representation and their calculus, and to furnish an introduction to the theories of functions of a complex variable as developed by Cauchy and Weierstrass.—*Three hours a week, throughout the year.*

Theory of Numbers.

*Two hours a week, throughout the year.*

Dr. GLOVER:—

Theory of Substitutions.

The first half of this course will be devoted to the development of the elementary notions of groups, and, in particular, to the properties of substitution groups. The second half will take up the application of the latter to the algebraic equation.—*Two hours a week, throughout the year.*

Theory of Invariants.

An introduction to the symbolic theory of invariants as developed by Aronhold, Clebsch, and Gordan.—*Two hours a week, throughout the year.*

**PHYSICS.**

The courses here announced presuppose about one and a half years' collegiate work in physics; viz., a course in mechanics, sound, light, electricity, magnetism, and heat, five hours a week, for one year; a beginners' course in laboratory work, two or three hours a week for half a year; and a course in primary and secondary batteries, two hours a week for half a year.

The courses in Mathematical Electricity, the Theory of Light, and the Theory of Heat, and the Advanced Laboratory Courses in Sound and Light, are primarily for graduates; the other courses are open to undergraduates, but they are found to be beyond the work done in many colleges.

Graduate students, who are properly qualified by their previous training, have opportunity for original research in the physical laboratory under the immediate supervision of the director and his associates.

Professor CARHART has leave of absence for 1899-1900.

Professor PATTERSON:—

Dynamo Electric Machinery.

*Three hours a week, second semester.*

### Alternate Current Apparatus.

*Three hours a week, first semester.*

### Alternate Current Phenomena: Steinmetz.

*Two hours a week, second semester.*

The three courses above named form a graded series covering the theory of dynamo-electric machines, alternate current working, transformers, and alternate current phenomena as applied to generators, distribution of power, and induction motors. Laboratory work forms a part of the first two courses.

### Mathematical Electricity.

This course is a treatment of the subject with the use of higher mathematics. Special attention is given to the Newtonian potential function, polarized distributions, electrostatics, electrokinetics, electromagnetism, and electromagnetic waves.—*Three hours a week, first semester; two hours a week, second semester.*

### Assistant Professor REED:—

#### The Theory of Sound.

Lectures and laboratory work. The lectures are based upon the works of Helmholtz and Rayleigh. The laboratory work involves acoustical and optical measurements of period, amplitude, and phase-difference of simple and compound vibrating systems; also the study of sensitive flames, organ pipes, resonators, and the application of stroboscopic methods to oscillating systems.—Lectures, *twice a week*; laboratory work, *twice a week, first semester.*

#### The Theory of Light: Preston.

The work involves a careful study of the text, with supplementary reading. The laboratory work includes measurements with the focometer, spectrometer, polarimeter, and interferometer; determination of wave-lengths by diffraction and interference methods; and a study of arc and solar spectra.—Lectures and recitations, *two hours a week*; laboratory work, *twice a week, second semester.*

#### Advanced Laboratory Work in Sound.

The work is devoted to a repetition of the classical experiments of Mach, Boltzmann, and Helmholtz; to the study of special problems; and to the application of optical methods to acoustical measurements.—*Twice a week, first semester.*

### Advanced Laboratory Work in Light.

The course includes a brief study of interference phenomena under high relative retardation; visibility curves for various spectral lines; the study of dispersion as affected by temperature; study of reflecting metallic films, with accompanying interference phenomena; and the special study of optical and electro-optical problems.—*Twice a week, second semester.*

Dr. GUTHE:—

### The Theory of Heat: Preston.

This course covers most of the text, including the chapters on thermodynamics.—*Two hours a week, first semester.*

### Laboratory Work in Heat.

This course comprises determinations of specific heat of solids and liquids; heat of fusion and of vaporization; the coefficient of expansion of solids, liquids, and gases; also experiments on the constants of gases and vapors, such as the specific heat of gases, vapor density, vapor pressure, etc.; also the determination of the mechanical equivalent of heat by electrical methods.—*Twice a week, first semester.*

### Theories of Solutions and of Electrolytes.

The work includes the osmotic theory of the voltaic cell, electrolytic resistance, and the internal resistance of primary batteries.—*Three times a week, second semester.*

Dr. GUTHE and Dr. TROWBRIDGE:—

### Electrical Measurements.

This course comprises, in addition to all the refined methods of measuring resistance, current, and electromotive force, a very thorough treatment of the subjects of capacity, inductance, and magnetism.—*Lectures, one hour a week, throughout the year; laboratory work, two or three times a week, first semester; twice a week, second semester.*

### GENERAL CHEMISTRY.

To be received as a candidate for a higher degree with chemistry as a major subject, the preparation must include the branches of general, analytical, and organic chemistry. The extent of work in these branches must have been equivalent in substance to the following named undergraduate courses in this University (University Calendar for 1898–99, pages 91 to 95): Course 2 or 5 in general chemistry, and Courses 1, (equivalent to Course 3 in general chemistry together with Course 3a in

analytical chemistry), 4, and 10 in analytical and organic chemistry,—making in all about twenty-seven hours of undergraduate credit.\* If chemistry be taken as a minor subject in work registered for a higher degree, preparation must have been made equivalent at least to undergraduate Courses 2 and 5 in general chemistry.

Candidates for a doctor's degree, in addition to the requirements above specified, must have satisfied the committee in charge of their studies as to their fitness to enter upon the higher work. A reading knowledge of German and French is necessary.

Graduate students who are not in work for a degree, and those who are preparing for registration as candidates for higher degrees according to the requirements above stated, will be directed in such chemical studies as they require.

A very complete chemical library, with a full set of journals in demand for research, and with current literature in all branches of chemistry, is provided in the University General Library. A reading room in the Chemical Laboratory furnishes duplicates of the full sets most used, as well as duplicates of the chief compilations.

Professor Freer:—

### Historical Chemistry.

Lectures and historical reading, covering the history of the science from the beginning to 1860.—*Two hours a week, first semester.*

### Chemical Literature; Journal Club.

The Journal Club discusses current chemical literature. It is under the direction of Professor FREER, but all the instructors and assistants in the department of general chemistry take part therein. All of the prominent Journals are divided among the participants, who report on the most interesting topics in rotation.—*One hour to one and one-half hours a week, throughout the year.*

### Laboratory Research.

The work may be either organic or inorganic, and the student is at liberty to select one from a number of topics proposed. The work includes the study of the literature bearing upon the topics. In order to accomplish results the student should have at least five clear half days a week to devote to the work. This statement applies to all research courses.—*Hours arranged with instructor, throughout the year.*

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\* An "hour of credit" implies the satisfactory completion of work equivalent to one exercise a week during one semester.

Mr. HIGLEY:—

Laboratory Work in Selected Topics of Inorganic Chemistry, including Inorganic Preparations.

This work is preparatory to research, and also includes a training in preparing demonstrations proper for use in teaching.—*Hours arranged with instructor, throughout the year.*

Laboratory Research in Inorganic Chemistry.

*Hours arranged with instructor, throughout the year.*

Mr. LICHTY:—

Laboratory Work with the Polariscope and the Spectroscope.

This course includes the theory of the instruments, their practical applications, and the study of stereochemical questions involved.—*Hours arranged with instructor, second semester.*

Laboratory Research.

Inorganic Chemistry.—*Hours arranged with instructor, throughout the year.*

Dr. SHERMAN:—

Laboratory Work in Selected Topics of Chemistry.

*Hours arranged with instructor, throughout the year.*

Laboratory Research.

Organic or Inorganic Chemistry.—*Hours arranged with instructor.*

Dr. BIGELOW:—

Physical and Theoretical Chemistry.

This course is intended to cover, in an elementary manner, all of the chief topics of modern theoretical and physical chemistry. It is preliminary to, or it should accompany, laboratory work. Lectures.—*Three hours a week, either semester.*

Laboratory Work in Physical Chemistry.

This course covers, as much as possible, the ground outlined in the lectures. It includes the standard methods of determining molecular weights, the theories of solution, dissociation, etc. It is essential for all who wish to become acquainted with modern chemistry.—*Hours arranged with instructor.*

**Laboratory Research.**

Physical Chemistry.—*Hours arranged with instructor.*

**ANALYTICAL CHEMISTRY AND ORGANIC CHEMISTRY.**

Professors PRESCOTT and CAMPBELL, Dr. GOMBERG, and Mr. WHITE:—

**Seminary in Recent Research.**

Library work upon chosen questions in pure and applied chemistry, discussions in the seminary, and the writing of reviews. A subject is assigned to each student, who reads in the journals by direction, and reports the literature for discussion, preparatory to the writing of his review. A record of all the work of the seminary is made by each member for himself.—*Two hours a week, throughout the year.*

Professor JOHNSON:—

**Qualitative Analytical Chemistry.**

Following undergraduate Course 1 (University Calendar for 1898-99, page 94) or its equivalent. Laboratory work and lectures.—*Lectures twice a week, second semester; laboratory work, hours arranged with instructor.*

Professor JOHNSON and Mr. TROWBRIDGE:—

**Investigation of Inorganic Reactions.**

Laboratory and library research.—*Hours arranged with instructors, throughout the year.*

Professor CAMPBELL:—

**Quantitative Analytical Chemistry.**

To follow undergraduate Course 4 (University Calendar for 1898-99, page 94) or its equivalent. Laboratory work directed by lectures in any of three courses, namely: (1) Advanced quantitative methods in general, (2) the analysis of minerals, (3) iron and steel analysis. Electrolytic methods are much employed and there is a room devoted to their use.—*Hours arranged with instructor, throughout the year.*

**Investigation in Analytical Method, Inorganic Structure, and Metallurgical Chemistry.**

Laboratory work upon questions related to researches published from this department. Use is made of Le Chatelier's pyrometer, as well as of calorimetric methods in study of heats of formation. Special work is given in micrometallography, as bearing upon the constitution of metals and their alloys.—*Hours arranged with instructor, throughout the year.*

Professor CAMPBELL and Mr. WHITE:—

Technical Methods and Investigations.

Laboratory work as follows: (1) Technical Gas Analysis, (2) Technical Examination of Gold and Silver Ores, (3) The investigation of some chosen subject in chemical industry, whether inorganic or organic.—*Hours arranged with instructors, throughout the year. In (2) the work must begin in first semester.*

Mr. WHITE:—

Chemical Technology.

Lectures on the main chemical industries, inorganic *in the first semester*, and organic *in the second semester*. Among the subjects treated are the alkali and acid industries, cements, wood and coal distillations, beet sugar, starch, glucose, paper, bleaching, dyeing, and tanning.—*Five hours a week, throughout the year.*

Mr. TROWBRIDGE:—

The Chemistry of Beet Sugar.

Laboratory work with lectures. The methods of analysis in sugar laboratories, the processes of beet sugar factories, and the several related chemical interests.—*Hours arranged with instructor, throughout the year, to begin in the first semester.*

Dr. GOMBERG and Mr. TROWBRIDGE:—

Analytical Organic Chemistry.

A laboratory course with lectures upon alkaloids; a laboratory course with lectures upon fats; laboratory work upon food analysis; the analyses for poisons; the chemical analysis of plants; the assay of drugs; special subjects.—*Hours arranged with instructors, throughout the year; the lectures in the second semester.*

Dr. GOMBERG:—

Lectures on Chosen Subjects.

For 1899–1900 the subject chosen is stereochemistry.—*Two hours a week, first semester.*

Lectures on the Benzene Derivatives.

Following undergraduate Course 10 (University Calendar for 1898–99, page 94) or its equivalent.—*Four hours a week, second semester.*

Organic Synthesis and Ultimate Analysis.

Laboratory work.—*Hours arranged with instructor, throughout the year.*



### Investigation in Organic Chemistry.

Laboratory work upon subjects related to publications from this laboratory.—*Hours arranged with instructor, throughout the year.*

Professor PRESCOTT:—

### Lectures on Organic Chemistry.

A beginning course.—*Five times a week, in either first or second semester.*

### Investigation in Organic or in Analytical Chemistry.

Laboratory and library research upon subjects selected.

### **BACTERIOLOGY, HYGIENE, PHYSIOLOGICAL CHEMISTRY.**

The courses here announced presuppose that the student taking them is prepared for original research.

Professor VAUGHAN:—

### Original Research on the Causation of Disease.

*Hours arranged with instructor, either first or second semester.*

Professor NOVY:—

### Special Methods in Bacteriology.

A course in advanced laboratory work in bacteriology. It deals with the preparation and use of Pasteur pipettes, the drawing of blood, the collection and sterilization of serum, the filtration of bacterial liquids, the preparation of tuberculin, tetanus, and diphtheria toxins, the preparation of antitoxic and anti-infectious sera, serum agglutination, the determination of the thermal death-point, of the action of antiseptics and disinfectants, the detection of bacteria in sections, the collodium sac method, inoculation for rabies, etc. The student, when qualified, is assigned special problems for investigation and research.

The course must be preceded by Courses 2 and 3, described in the University Calendar for 1898-99, page 97.—*Hours arranged with instructor, either first or second semester.*

### Advanced Physiological Chemistry.

Laboratory work and reading.—*Hours arranged with instructor, either first or second semester.*

### Methods of Hygiene.

Chemical and bacteriological examination of water, air, soil, milk, butter, etc.—*Hours arranged with instructor, either first or second semester.*

**ASTRONOMY.**

A knowledge of general astronomy and calculus is required for all courses. In the theoretical courses a careful training is given in those principles of exact astronomy which should be prerequisites for all investigations.

Professor HALL:—

**Spherical Astronomy.**

Transformation of coordinates, precession, nutation, aberration, determination of fundamental constants, and theory of instruments.—  
*Three hours a week, throughout the year.*

**Theory of Least Squares.**

*Two hours a week, first semester.*

**Theory and Computation of Orbits.**

*Five hours a week, first semester.*

**Mathematical Theory of Planetary Motion.**

*Three hours a week, second semester.*

**Extended Practical Course.**

*Hours arranged with instructor, throughout the year.*

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NOTE.—The Observatory is provided with a 12 $\frac{3}{4}$ -inch equatorial by Fitz, a 6 $\frac{1}{3}$ -inch Pistor and Martins meridian circle, 6-inch Fauth equatorial, 3-inch meridian transit with zenith telescope attachments, surveyor's transit, sextant, chronograph, and chronometers.

**MINERALOGY.**

The higher work in mineralogy presupposes an elementary knowledge of chemistry and an introductory course in mineralogy, combining theoretical instruction with practice in determining minerals. The work is directed by Professor PETTEE.

**GEOLOGY.**

The course of instruction in geology for undergraduates, as announced in the University Calendar for 1898–99, pages 100 and 101, embraces from two to three years of University work. The first year is devoted to elementary studies in physical geology, historical geology, and physical geography, giving three hours a week to each for one semester. Le Conte's Elements of Geology and Dana's Manual of Geology are used, supplemented by lectures and exhibitions of specimens, maps, etc. Dur-

ing the second year more detailed instruction is given, two hours each week, in the same general subjects. Green's Physical Geology is used for reference during the first semester, supplemented by lectures and laboratory work. Each student is given a special subject for investigation in connection with which a thesis of about 2500 words is required. During the second semester palæontological studies are carried on with the aid of various treatises and laboratory work. A special subject is assigned each student and a short thesis is required.

Students in the graduate school may enter either of the advanced courses mentioned above, providing studies equivalent to the elementary courses have been pursued. Those who have done more work than is represented by the elementary course may make special arrangements for instruction and assistance in various lines of study, dependent on their tastes and acquirements. In a general course the current literature of geology will be read with special reference to Pleistocene geology, and to the origin and classification of topographic forms, glacial records, lake histories, erosion, and all of the processes by which the surface of the earth has come to have its present form.

The geological museum is being rearranged and a series of fossils selected to illustrate the life history of North America. This collection is intended especially for the use of students in the elementary courses, but may be consulted by advanced students as well. The specimens will be exhibited in the lecture room as required, and after lectures will be returned to the cases in the museum where they will be available for examination at any time.

There is a second collection embracing some ten thousand specimens of both American and European fossils, which is arranged zoologically and intended for the use of advanced students in palæontology. Special collections of rocks, brachiopods, corals, etc., numbering from one hundred and fifty to two hundred specimens each are arranged in the geological laboratory for the immediate use of students.

The collection in physical geology is small, but efforts are being made for its enlargement, and ample material will be on hand to illustrate lectures in this department. Students bringing private collections will be given an opportunity to arrange them in cases provided for the purpose, and facilities for consulting original monographs, and making comparison with specimens in the museum.

The geological laboratory is provided with apparatus for preparing thin sections of fossils and rocks, and with microscopes and photographic instruments. The laboratory is open to students from nine until five each day throughout the collegiate year.

The work in geology is conducted by, or under the direction of, Professor RUSSELL.

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**BOTANY.**

The work in botany in this University is divisible into morphology, physiology, and classification. For the study of each of these divisions there are specially equipped rooms with a large amount of general and special apparatus. New apparatus is purchased or constructed as it may be needed in investigation. In the laboratory is shelved a working library, including the leading domestic and foreign journals and ample facilities for tracing the literature of any subject.

The herbarium contains 80,000 specimens, being especially rich in algae and economic fungi. A plant garden on the campus, adjacent plant houses, and woods, fields, swamps, and waters in the vicinity furnish material for study and opportunity for experiment.

To be admitted to graduate work, a student must have pursued the collegiate study of botany for at least a year. A minor in botany for the master's degree will not include research; but a major in botany for the master's degree may include research, or may be taken wholly in courses, according to preparation and needs of the candidate. In any case the candidate receives special supervision and direction from the instructor. For the doctorate, a minor in botany will be approximately equivalent to a major for the master's degree. The requirements for a major are to be found on page 8 of this Announcement.

**A. FOR GRADUATES AND UNDERGRADUATES.**

The equivalent of a full year in the collegiate study of botany is required for admission to any of the courses named below, nearly all of which consist largely of laboratory work.

Professor SPALDING:—

**Morphology and Physiology of Fungi.**

In this course special attention is given to the identification of fungi, their habits of growth and reproduction, and their relation to plant and animal diseases. Lectures and laboratory work.—*Five hours a week, throughout the year.*

**The Natural Families of Plants.**

A review of the leading groups of plants with primary reference to relationship, distribution, and biological characters. Lectures with reading and demonstrations.—*Two or more hours a week, second semester.*

**Ecology.**

A study of the relation of plants to their environment. Lectures, demonstrations, and observational work.—*One hour a week, first semester.*

Professor NEWCOMBE:—

General Morphology and Physiology.

Cell structure, tissue structure, and organography; the cell theory, mitosis, heredity; practice in technique. Lectures and laboratory work.—*Five hours a week, first semester.*

Experimental Physiology of Plants.

A laboratory and outdoor study of the relation of plants to their environment, as manifested by the phenomena of nutrition, growth, and irritability. This work is divided into two courses; the more elementary course is given the *second semester*, and may be followed in the *first semester* of the next year by the more advanced course which is preparatory to research. Lectures and laboratory work.—*Five or more hours a week, throughout the year.*

Dr. POLLOCK:—

Reproduction and Embryology of Flowering Plants.

A study of the development of pollen and the embryo sac; fertilization; alternation of generations; embryology. Lectures and laboratory work.—*Three hours a week, second semester.*

Dr. SNOW:—

Experimental Morphology.

A study of the influence of environment and the factors in the development of the forms of plants. The material used for experiment is supplied mostly from various species of algae. Lectures and laboratory work.—*Three or more hours a week, throughout the year.*

B. PRIMARILY FOR GRADUATES.

Professor SPALDING:—

Investigations in the Morphology and Physiology of Fungi.

Fungous diseases, general morphology, relationship, distribution, ecology.

Professor NEWCOMBE:—

Investigations in Physiology and Cytology.

Problems in plant nutrition, growth, irritability, reproduction, cell division, and cell physiology.

**The BOTANICAL FACULTY:—****Current Literature.**

The instructors, graduate students, and advanced students spend an evening once a fortnight in reviewing and discussing the current literature of botany.

**ZOOLOGY.**

The courses here announced presuppose a year's work in general biology, such as is carried on in this University conjointly by the departments of botany and zoology. Following the general biology, work is provided in both invertebrate and vertebrate zoology. Candidates for the higher degrees will usually pursue both lines of work, but will find it of advantage to specialize in one of them; they will also be required to have a knowledge of the elements of physics and chemistry and some acquaintance with French and German.

In the laboratory, a description of which is given in the University Calendar for 1898-99, page 32, the student learns methods of dissection, staining, imbedding, section-cutting, graphic and solid reconstruction, experimentation, and other technical methods of investigation. A library shelved in the laboratory contains sets of the important English and foreign periodicals, as well as many monographs, and other separate publications. It contains also an extensive collection of original papers relating to the invertebrate fauna of fresh waters. The private collections of the instructors and the library of the Department of Medicine and Surgery, which is rich in the literature of vertebrates, are also accessible to students. The original papers in connection with both lectures and laboratory work are placed in the hands of students, and special reading is required.

Graduate students will often find the elementary work in general biology of value to them, and they can rarely omit, without loss, any of the courses in zoology that are open to undergraduates.

A student who selects zoology as a *minor* for the *master's degree* may pursue the course in invertebrate zoology, vertebrate zoology and comparative anatomy, vertebrate embryology, or experimental morphology, but is not required to do work in more than one of these subjects. If zoology be chosen as a *major*, work may be taken in any two of the branches named above. For any of the branches the students may substitute research work; and such substitution is advised for those who do not intend to become candidates for the doctor's degree.

The work outlined for those who elect zoology as a major for the master's degree is suitable for candidates for the *doctor's degree* who elect this subject as a *minor*.

Those electing zoology as a *major* for the *doctor's degree* are expected

to complete all the courses offered. During the first part of his term of residence at the University, the candidate should devote his time to these courses and to the completion of work on the minors. In his second year of residence, in addition to completing the work mentioned, he is expected to repeat a designated piece of research work in order to acquaint himself with methods of investigation. At the same time he does assigned reading on the more important problems of zoology and on zoological history and theory. At the least one year must be devoted to the research which is to be embodied in the doctor's dissertation.

Those electing zoology as a major, will find it of advantage to select as a *minor study*, some one of the following subjects: Anatomy, histology, botany, physiology, palæontology, physiological psychology. Less closely related is work in bacteriology, physiological and organic chemistry, and geology.

#### A. PRIMARILY FOR GRADUATES.

Professor REIGHARD:—

##### Current Literature of Zoology.

The instructors and advanced students hold weekly meetings at which reports are made on important current papers, followed by informal discussion. Although the meetings are open to all, the membership is restricted.—*One hour a week, throughout the year.*

Research work in zoology, invertebrate morphology, and vertebrate comparative anatomy, embryology, and histology.

Definite problems are assigned and worked out under the constant supervision of the instructor. The locality affords exceptional advantages for work on vertebrate embryology (Petromyzon, several Teleosts, Amia, Acipenser, Amblystoma, and other forms are under control) and for faunistic or experimental studies in invertebrates. Students intending to begin this work should confer with the professor in charge as early as the preceding spring in order that they may have time in which to prepare necessary material.—*Hours arranged with instructor, throughout the year.*

#### B. FOR GRADUATES AND UNDERGRADUATES.

Professor REIGHARD:—

Vertebrate Zoology [The Classification, Comparative Embryology, and Anatomy of Vertebrates].

The work in embryology, which precedes the anatomy, begins with a study of the early stages of fishes and amphibia and concludes with

detailed work on the chick. In anatomy a few type forms are dissected and preparations of other forms are studied. The lectures are illustrated by charts and preparations especially designed for the purpose of this course.—*Six hours a week, throughout the year.*

This work may be advantageously preceded by the undergraduate course in mammalian anatomy (Course 5, University Calendar for 1898-99, page 106) and the courses in histology (Courses 7 and 8, University Calendar for 1898-99, page 108) though these courses are not required.

Dr. LILLIE:—

### Invertebrate Zoology.

The lectures treat of the classification, habits, comparative anatomy, and ontogeny of invertebrates, with special reference to environment and adaptation. The demonstrations include a series of forms which supplement that studied in the course in general biology.—*Five hours a week, first semester.*

### Comparative Anatomy of Invertebrates.

Laboratory work in invertebrate types not included in the course in general biology.—*Three hours a week, first semester.*

### Experimental Morphology.

The lectures review recent experimental work in embryology and show the bearing of the results on theories of heredity. The internal and external factors of development will be treated in alternate years.—*One hour a week, second semester.*

By special arrangement this course may be extended to *three hours a week*, and will then include laboratory work. A similar laboratory course is available in the first semester. A laboratory has been fitted up especially for this work.

Mr. ———:—

### Mammalian Anatomy.

Dissection of the cat, with class-meetings twice a week for quizzes on the anatomy of the cat and for such lectures as may be necessary. It is the purpose of the course to afford a training in mammalian anatomy which shall be substantially equivalent to the training which the medical student receives in human anatomy. This training gives that mastery of anatomical facts and that knowledge of anatomical technique, which are believed to furnish the most satisfactory basis for the study of human or comparative anatomy. The class makes use of type-written copies of a descriptive anatomy of the cat prepared by Professor REIGHARD.—*Six times a week, second semester.*



### Museum Work.

Students desiring to carry on systematic work on special groups represented in the University Museum, will be given every opportunity to do so, but must first satisfy the instructor in charge of their fitness to pursue the work.—*Either first or second semester.*

### The ZOOLOGICAL FACULTY:—

#### Field Club.

This is a voluntary organization of zoological students for the purpose of collecting, identifying, studying, and preserving specimens of the local fauna. Occasional meetings are held for lectures and for other purposes. Members of the zoological staff are members of the club and take part in its work.—*Second semester.*

### PHYSIOLOGY.

The advanced work in physiology presupposes a knowledge of anatomy, including histology, and the elements of physics and chemistry. The required training is to be got from courses described in the University Calendar for 1898-99, pages 90 to 108, such as 1 and 2 in general biology, 5 in zoology, 8 and 9 in anatomy, 1, 2, and 3a in physics, 5 in general chemistry, and 28 in organic chemistry. Ability to read German is indispensable, and French is desirable, for students taking physiology as a major study for an advanced degree, though in some cases a candidate may be considered qualified to begin his advanced work prior to the completion of these requirements.

### Professor LOMBARD:—

#### Lectures and Recitations.

*Five hours a week, throughout the year.*

#### Laboratory Course.

*Four afternoons a week, one-third of a semester.*

#### Advanced Course in Physiological Experimentation.

*One afternoon a week, one semester.*

#### Physiological Research and Collateral Reading.

Arranged to meet the needs of students who take physiology as a major study.

# Catalogue of Students, 1898-99.\*

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## RESIDENT GRADUATES.

| NAME.                                                                                                                           | RESIDENCE.                 |
|---------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| †Florence Lavinia Abbott, Ph.B., 1899,<br>Mathematics; Physics; English Literature.                                             | <i>Ann Arbor.</i>          |
| George Henry Allen, A.B., 1898,<br>History; Greek; Latin.                                                                       | <i>Grand Rapids.</i>       |
| Lewis Oliver Atherton, B.S., <i>Albion College</i> , 1895,<br>Zoology; Experimental Morphology; Botany.                         | <i>Ovid.</i>               |
| Martin Darrelle Atkins, A.B., 1886,<br>Physics; Organic Chemistry; Mathematics.                                                 | <i>Lake Forest, Ill.</i>   |
| Anna Mary Baker, B.L., 1898,<br>American History; Rhetoric; Political Economy.                                                  | <i>Saint Louis, Mo.</i>    |
| Edna Lenore Ballard, A.B., 1898,                                                                                                | <i>Ann Arbor.</i>          |
| John Watson Beach, A.B., 1896,<br>Latin; Greek; Philosophy.                                                                     | <i>Lexington.</i>          |
| Willis Thomas Bishop, B.S., <i>Olivet College</i> , 1893,<br>American History; European History; Pedagogy.                      | <i>Dimondale.</i>          |
| Merrill Jay Blanden, A.B., <i>Colgate University</i> ,<br>1894,<br>Latin; Greek; Pedagogy.                                      | <i>Belleville, N. Y.</i>   |
| Clara Louisa Botsford, B.L., 1898,                                                                                              | <i>Plainwell.</i>          |
| Esther Braley, A.B., 1898,                                                                                                      | <i>Saginaw, West Side.</i> |
| Albert E. Broene, A.B., <i>Kalamazoo College</i> , 1897,<br>A.B., <i>University of Chicago</i> , 1898,<br>Greek; Latin; German. | <i>Kalamazoo.</i>          |
| Elizabeth Alma Campbell, Ph.B., 1891,                                                                                           | <i>Ann Arbor.</i>          |

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\*The principal subjects of study pursued by candidates for an advanced degree are indicated under their respective names.

An asterisk (\*) before a student's name indicates that the student is also pursuing studies in the Department of Medicine and Surgery.

A dagger (†) indicates that the student was admitted to the Graduate School at the beginning of the second semester, on completion of the requirements for the bachelor's degree indicated in each case, though the degree was not to be conferred until the end of the year.

The letter s denotes that the student was enrolled in the summer school.

- Lewis Clinton Carson, A.B., 1892, A.B., *Harvard University*, 1893, *Detroit.*  
History of Philosophy; Philosophy of Religion; Sociology.
- †Edmund Claude Champion, B.S., 1899, *Three Rivers.*  
Analytical Chemistry; Chemical Technology; Geology.
- †Lelia Merrill Childs, B.S., 1899, *Ann Arbor.*  
Physics; Mathematics; General Chemistry.
- James Edward Church, Jr., A.B., 1892, *Reno, Nevada.*  
Latin; Greek; Comparative Philology.
- \*Galen Greenfield Crozier, B.S., 1894, *Ann Arbor.*  
Physiological Psychology; Physiology; Anatomy of Nervous System.
- Alfred LaRue Davenport, B.S., *Pomona College*, 1897, *Pomona, Cal.*  
Physics; Chemistry; Mathematics.
- s. Edwin De Barr, Ph.B., 1892, *Norman, Okla. Ter.*
- Joseph Horace Drake, A.B., 1885, *Ann Arbor.*  
History; Latin; Jurisprudence.
- Charles Edmund Filkins, B.L., 1891, *Burton.*  
English Literature; French; Pedagogy.
- Clarence James Foreman, B.S., *Mich. Agr. Coll.*, 1894, M.S., *ibid.*, 1896, *Harbor Springs.*  
Political Economy; Pedagogy; Sociology.
- Colman Dudley Frank, Ph.B., 1897, *Toledo, O.*  
French; German; Spanish.
- †George Washington Furrey, Ph.B., 1899, *Holyoke, Col.*  
Mathematics; Physics; Mechanics.
- Christian Frederick Gauss, A.B., 1898, *Ann Arbor.*  
French; Spanish; Aesthetics.
- Anna Bordwell Gelston, Ph.B., 1881, *Ann Arbor.*
- Theresa Alvina Grube, B.L., 1896, *Ann Arbor.*  
German Literature; German Philosophy; History.
- \*Augustus Ernest Guenther, B.S., 1898, *Sandusky, O.*  
Physiology; Physiological Chemistry; Histology.
- George Depue Hadzsits, A.B., 1895, A.M., 1896, *Detroit.*  
Greek; Latin; Classical Antiquities.
- Walter David Hadzsits, A.B., 1898, *Detroit.*  
Latin; Greek; Sanskrit.
- Arthur Graham Hall, B.S., 1887, *Ann Arbor.*  
Mathematics; Physics; Mechanics.
- Parker Sedgwick Halleck, A.B., *Colorado College*, 1882, *Beaumont, Tex.*  
Pedagogy; Organic Chemistry; General Chemistry.

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|------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| William Henry Hawkes, A.B., 1887,<br>Physics; Mathematics; Chemistry.                                                        | <i>Ann Arbor.</i>        |
| †Kate Healy, Ph.B., 1899,<br>Latin; French; English Literature.                                                              | <i>Fort Dodge, Ia.</i>   |
| Henry William Hess, B.S., 1898,<br>Analytical Chemistry; Organic Chemistry; Economic Geology.                                | <i>Toledo, O.</i>        |
| William Hugh Hess, B.S., 1898,<br>Organic Chemistry; Analytical Chemistry; Geology.                                          | <i>Woodstock.</i>        |
| Frances Hinkley, B.S., 1890,<br>Organic Chemistry; Analytical Chemistry; International Law.                                  | <i>Benton Harbor.</i>    |
| Mary Louisa Hinsdale, A.B., <i>Adelbert College</i> ,<br>1885, A.M., 1890,<br>Pedagogy; Political Economy; American History. | <i>Ann Arbor.</i>        |
| Alice Sarah Hussey, A.B., <i>Vassar College</i> , 1894,<br>Rhetoric; Aesthetics; English Literature.                         | <i>Rochester, N. Y.</i>  |
| †Carl Henry Ibershoff, B.L., 1899,<br>German; French; History.                                                               | <i>Saginaw.</i>          |
| Paul Phelps Ingham, A.B., 1898,<br>Latin; Greek; Pedagogy.                                                                   | <i>Ann Arbor.</i>        |
| Lambert Lincoln Jackson, A.B., 1897,<br>Mathematics; Mechanics; Pedagogy.                                                    | <i>Ypsilanti.</i>        |
| Samuel Allen Jeffers, A.B., <i>Central Wesleyan<br/>College</i> , 1892, A.M., 1897,<br>Latin; Greek; Ancient Ethics.         | <i>New Florence, Mo.</i> |
| John Black Johnston, Ph.B., 1893,<br>Zoology; Physiological Psychology; Physiology.                                          | <i>Ann Arbor.</i>        |
| Hannah Emily Keith, B.L., 1898,<br>American History; German; Political Economy.                                              | <i>Terre Haute, Ind.</i> |
| Stephen Herbert Langdon, A.B., 1898,<br>Hebrew; Assyrian; Greek.                                                             | <i>Ida.</i>              |
| Eugene LaRowe, A.B., 1896, A.M., 1898,<br>Latin; Ethics; Ancient Philosophy.                                                 | <i>Webberville.</i>      |
| John Edward Lautner, B.L., 1895, M.L., 1896,<br>German Literature; German Philology; Philosophy.                             | <i>Ann Arbor.</i>        |
| Clement Charles Lemon, A.B., <i>Indiana Uni-<br/>versity</i> , 1894,<br>Botany; Vegetable Morphology; Zoology.               | <i>La Grange, Mo.</i>    |
| John Hancock McClellan, A.B., 1897,<br>Vertebrate Zoology; Experimental Morphology; Physiology.                              | <i>Lexington, Ky.</i>    |
| Norman King McInnis, A.B., 1898,<br>English Literature; Rhetoric; Aesthetics.                                                | <i>Saginaw.</i>          |
| †Charles William Mickens, B.L., 1899,<br>American History; English Literature; Pedagogy.                                     | <i>Ann Arbor.</i>        |

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- Yoshinaga Mikami, *Keio College*, 1897, *Kofu, Japan.*
- Mary Lovicy Miner, Ph.B., 1882, *Ann Arbor.*  
Latin; French; Roman Political Antiquities.
- William August Mogk, A.B., 1897, M.D., 1898, *Ann Arbor.*  
Experimental Pharmacology; Physiological Chemistry; Anatomy of Nervous System.
- Paul Ingold Murrill, B.S., *State College of Kentucky*, 1895, M.S., *ibid.*, 1896, *Detroit.*  
Organic Chemistry; General Chemistry; Bacteriology.
- Oscar Reiff Myers, Ph.B., 1898, *New Enterprise, Pa.*  
Rhetoric; Pedagogy; English Literature.
- Henry Hall Parke, B.L., 1898, *Sycamore, Ill.*  
Experimental Zoology; Vertebrate Zoology; Physiology.
- Adelia Miner Randall, A.B., *Wellesley College*, 1895, *Alton, Ill.*  
German; Pedagogy; English Literature.
- J. Harrison McAllister Randall, Ph.B., 1893, *Saginaw.*  
Ph.M., 1894,
- Thomas Ernest Rankin, A.B., 1898, *Detroit.*  
Rhetoric; Aesthetics; Sociology.
- George Fletcher Richmond, B.S., *Michigan Agricultural College*, 1898, *Smyrna.*  
General Chemistry; Analytical Chemistry; Physics.
- Eugene Charles Rowe, A.B., *Olivet College*, 1897, *Monroe.*  
Metaphysics; Pedagogy; Ethics.
- Herman Russell, B.S., 1898, *Manistee.*  
Organic Chemistry; Analytical Chemistry; Chemical Technology.
- Margaret Anna Schaffner, A.B., *College of Emporia*, 1895, *Morganville, Kan.*  
Political Economy; Sociology; American History.
- Lillie Maria Shaw, A.B., 1884, *Saginaw.*  
Greek; Latin; Classical Archaeology.
- Hudson Sheldon, A.B., 1891, *Corunna.*  
General Chemistry; Physics; Mathematics.
- Will Hittell Sherzer, B.S., 1889, M.S., 1890, *Ypsilanti.*  
Geology; Zoology; Palæontology.
- John Willis Slaughter, A.B., *Lombard University*, 1898, B.D., *ibid.*, 1898, *Canfield, Ala.*  
Metaphysics; Psychology; French.
- Evelyn Mary Smith, B.L., *Hillsdale College*, 1892, *Dowagiac.*  
Latin; German; Rhetoric.
- Shirley Wheeler Smith, B.L., 1897, *Hastings.*  
English Literature; History; Rhetoric.

- s. Mary Duty Spencer, A.B., *Vassar College*, 1896, *Detroit*.  
American History; Latin; Rhetoric.
- Carrie May Sperry, A.B., 1893, *Ann Arbor*.  
Latin; Greek; Hygiene.
- Duane Reed Stuart, A.B., 1896, *Holder of the Eli-  
sha Jones Classical Fellowship*, *Detroit*.  
Greek; Latin; Classical Archæology.
- James Wellings Sturgis, A.B., 1896, A.M., 1897, *Ann Arbor*.  
Latin; Greek; Philosophy.
- Frank Stone Swift, B.S., *Olivet College*, 1897, *Olivet*.  
General Chemistry; Physics; Mathematics.
- Itsuo Tokunaga, *Doshisha College*, 1894, 1896, *Yanagawa, Japan*.  
Political Economy; Finance; History.
- Abraham Van Zwaluwenburg, Ph.C., 1887, B.S.,  
1898, B.S. (*Pharm.*), 1898, *Ann Arbor*.  
Organic Chemistry; Metallurgy; Botany.
- †May Walmsley, Ph.B., 1899, *La Grange, Ill.*  
European History; American History; Sociology.
- Frederick Henry Weng, Ph.B., 1898, *Marine City*.  
German; Latin; English Philology.
- Eugene Cyrus Woodruff, B.S., 1894, M.S., 1896, *Ludington*.  
Physics; Mathematics; Organic Chemistry.
- Loura Bayne Woodruff, A.B., 1895, *Ann Arbor*.  
Greek; Latin; German.
- Robert Thompson Young, B.S., *University of  
Pennsylvania*, 1896, *Philadelphia, Pa.*  
Zoology; Botany; Geology.

### CANDIDATES FOR A MASTER'S DEGREE, STUDYING IN ABSENTIA.

- | NAME.                                                                                          | RESIDENCE.              |
|------------------------------------------------------------------------------------------------|-------------------------|
| Mary Sophia Case, A.B., 1884,<br>British Philosophy; Political Philosophy; English Literature. | <i>Wellesley, Mass.</i> |
| Henry Ormal Severance, A.B., 1897,<br>English Literature; Bibliography; Pedagogy.              | <i>Ann Arbor.</i>       |

UNIVERSITY OF MICHIGAN

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M 62 H. J.

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DEPARTMENT OF LITERATURE, SCIENCE,  
AND THE ARTS

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# Graduate School

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ANNUAL ANNOUNCEMENT

FOR

1900-1901

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ANN ARBOR  
PUBLISHED BY THE UNIVERSITY  
1900





UNIVERSITY OF MICHIGAN

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DEPARTMENT OF LITERATURE, SCIENCE,  
AND THE ARTS

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GRADUATE SCHOOL

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ANNUAL ANNOUNCEMENT

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ANN ARBOR  
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1900

## CALENDAR.

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1900.

Sept. 20-22. *Examination for Admission to the Department of Literature, Science, and the Arts.*

Sept. 25. FIRST SEMESTER BEGINS IN ALL DEPARTMENTS OF THE UNIVERSITY.

Nov. —. Thanksgiving Recess of three days, beginning Tuesday evening, in all Departments of the University.

Dec. 21. (Evening.) Holiday Vacation begins in all Departments.

1901.

Jan. 8. Exercises resumed.

Feb. 8. (Evening.) FIRST SEMESTER CLOSES.

Feb. 11. SECOND SEMESTER BEGINS.

April 12. (Evening.) Recess begins, ending April 22 (evening).

June 20. COMMENCEMENT IN ALL DEPARTMENTS OF THE UNIVERSITY.

## ADMINISTRATIVE COUNCIL.

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JAMES B. ANGELL, LL.D., *President.*

ALBERT B. PRESCOTT, M.D., LL.D., *Director of the Chemical Laboratory, and Professor of Organic Chemistry.*

REV. MARTIN L. D'OUGE, LL.D., *Professor of the Greek Language and Literature.*

WILLIAM H. PETTEE, A.M., *Professor of Mineralogy, Economic Geology, and Mining Engineering.*

ISAAC N. DEMMON, LL.D., *Professor of English and Rhetoric.*

ALBERT H. PATTENGILL, A.M., *Professor of Greek.*

WOOSTER W. BEMAN, A.M., *Professor of Mathematics.*

VICTOR C. VAUGHAN, Ph.D., ScD., M.D., *Professor of Hygiene and Physiological Chemistry, and Director of the Hygienic Laboratory.*

CHARLES S. DENISON, M.S., C.E., *Professor of Descriptive Geometry, Stereotomy, and Drawing.*

HENRY S. CARHART, LL.D., *Professor of Physics, and Director of the Physical Laboratory.*

VOLNEY M. SPALDING, Ph.D., *Professor of Botany.*

HENRY C. ADAMS, LL.D., *Professor of Political Economy and Finance.*

BURKE A. HINSDALE, LL.D., *Professor of the Science and the Art of Teaching.*

RICHARD HUDSON, A.M., *Professor of History, and Dean of the Department of Literature, Science, and the Arts.*

ALBERT A. STANLEY, A.M., *Professor of Music.*

\*FRANCIS W. KELSEY, Ph.D., *Professor of the Latin Language and Literature.*

OTIS C. JOHNSON, Ph.C., A.M., *Professor of Applied Chemistry.*

PAUL C. FREER, Ph.D., M.D., *Professor of General Chemistry and Director of the Laboratory of General Chemistry.*

ANDREW C. McLAUGHLIN, A.M., LL.B., *Professor of American History.*

ASAPH HALL, JR., Ph.D., *Professor of Astronomy and Director of the Observatory.*

ISRAEL C. RUSSELL, C.E., LL.D., *Professor of Geology.*

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\*Absent on leave for the year 1900-01.

- WARREN P. LOMBARD, A.B., M.D., *Professor of Physiology.*  
JACOB E. REIGHARD, Ph.B., *Professor of Zoology, and Director of the Zoological Laboratory and the Zoological Museum.*  
THOMAS C. TRUEBLOOD, A.M., *Professor of Elocution and Oratory.*  
JAMES A. CRAIG, Ph.D., *Professor of Semitic Languages and Literatures and Hellenistic Greek.*  
JOHN C. ROLFE, Ph.D., *Professor of Latin.*  
J. PLAYFAIR McMURRICH, Ph.D., *Professor of Anatomy.*  
ROBERT M. WENLEY, Sc.D., D.Phil., *Professor of Philosophy.*  
ELIZA M. MOSHER, M.D., *Professor of Hygiene.*  
\* ——— ———, *Professor of Germanic Languages and Literatures.*  
GEORGE HEMPL, Ph.D., *Professor of English Philology and General Linguistics.*  
ARTHUR G. CANFIELD, A.M., *Professor of Romance Languages and Literatures.*  
FREDERICK G. NOVY, Sc.D., M.D., *Junior Professor of Hygiene and Physiological Chemistry.*  
EDWARD D. CAMPBELL, B.S., *Junior Professor of Analytical Chemistry.*  
FRED M. TAYLOR, Ph.D., *Junior Professor of Political Economy and Finance.*  
FRED N. SCOTT, Ph.D., *Junior Professor of Rhetoric.*  
ALEXANDER ZIWET, C.E., *Junior Professor of Mathematics.*  
GEORGE W. PATTERSON, JR., A.M., S.B., *Junior Professor of Physics.*  
FREDERICK C. NEWCOMBE, Ph.D., *Junior Professor of Botany.*  
ALLEN S. WHITNEY, A.B., *Junior Professor of the Science and the Art of Teaching.*  
G. CARL HUBER, M.D., *Junior Professor of Anatomy.*  
JOHN O. REED, Ph.D., *Junior Professor of Physics.*  
ALFRED H. LLOYD, Ph.D., *Junior Professor of Philosophy.*  
CHARLES H. COOLEY, Ph.D., *Assistant Professor of Sociology.*
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\* The Department of German is temporarily in charge of Assistant Professor Max Winkler, Ph.D.

# ANNOUNCEMENT OF THE GRADUATE SCHOOL.

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## GENERAL INFORMATION.

### **The University of Michigan.**

The University of Michigan is a part of the educational system of the State, and derives from the State, in one way or another, the greater part of its revenue. The University comprises the Department of Literature, Science, and the Arts, and six professional schools, each of which has its own Faculty and issues each year a separate departmental Announcement. In the several faculties there were in 1899-1900 one hundred and forty-six officers of instruction besides numerous assistants, some of whom participated in the work of teaching. Including the Summer Schools, 3,441 students, representing forty-nine States and Territories, and nine foreign countries were in attendance.

### **The Department of Literature, Science, and the Arts.**

In the Department of Literature, Science, and the Arts, the aim is to cover the broad field of general university study of the ancient and the modern languages and literatures, of history, philosophy, science, and the liberal arts, as distinguished from the more special work of the professional schools. Its Faculty numbered, in 1899-1900, ninety-seven regular teachers and seventeen assistants. The students in attendance numbered thirteen hundred and forty-three, of whom ninety were graduates. The presence of such a number of graduate students, taken with the fact that high specialization of work is not uncommon among undergraduates, tends to create a genuine university atmosphere and to assure the advanced student of intellectual comradeship.

### **The Libraries.**

The various libraries of the University contain more than 133,000 volumes, and include a number of important special collections. Among

these are the McMillan Shakespeare Library, 4,825 volumes; the Parsons Library (political science), 4,325 volumes; the Hagerman Collection (history and political science), 2,660 volumes, and the Goethe Library of 952 volumes. The general reading room seats two hundred and ten readers, and separate rooms are provided for advanced students to work in, with the necessary books close at hand. Under certain restrictions graduate students have access to the book rooms. The library takes seven hundred and seventy-five periodicals, and is open, in term time, fourteen hours daily, except on Sundays and legal holidays. During the summer vacation it is open nine hours a day for the six weeks of the Summer Session, and six hours a day for the remainder of the time.

### **The Laboratories.**

The University has an observatory and a large number of laboratories more or less fully equipped for routine instruction and for original research. The laboratories (omitting those connected exclusively with the work of the Engineering, Medical, and Dental Schools) are: the Anatomical, Botanical, Chemical, Geological, Histological, Hygienic, Physical, Physiological, Psychological, and Zoological. For a fuller account of them and their various resources, as also of the University collections for the study of art, archæology, ethnology, mineralogy, palæontology, systematic zoology, etc., consult the annual Calendar, which may be had gratis on application to Mr. James H. Wade, Secretary of the University.

### **Societies.**

There are connected with the University a number of voluntary literary, philosophical, and scientific organizations which add not a little to the graduate student's opportunity for general training. The membership of these societies consists usually of University teachers and advanced students who are pursuing a common specialty. They are variously organized and meet weekly, fortnightly, or monthly, as the case may be, for the reading and discussion of formal papers, for reports upon observation and experiment, reviews of recent literature, etc.

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## **ORGANIZATION OF GRADUATE WORK.**

### **The Graduate School.**

The Graduate School was organized in the Spring of 1892 in connection with the Department of Literature, Science, and the Arts. Its purpose is to bring into increased prominence the numerous advanced courses offered in that department—courses that have developed during

the past few years from the continual extension of the elective system,—and to recognize and announce them as something distinct from the work of an ordinary college course. It aims to make provision for a more systematic and efficient administration of the higher work, and, so far as possible, for the separate instruction of graduate students. It also aims to lay foundations for the future development of university (as distinguished from collegiate) work. The management of the School is entrusted to an Administrative Council, of which the President of the University is chairman.

The regulations of the University respecting graduate work that were formerly in force, have been modified in a few particulars by the Council, and it is possible that still further changes may be made in the year to come. The more important of these regulations are explained in the pages that follow.

### **The University System.**

Every graduate student who is a candidate for a higher degree, works upon the so-called 'university system,' the essential features of which are specialization of study, a final examination, and a thesis. The student selects a 'major study' and, in general, two 'minor studies,' his selection being subject, however, to the approval of the Council. When the choice has been made and approved, the student's work is henceforth under the immediate supervision of a committee consisting of those professors who have charge of the studies chosen, the one having charge of the major study being chairman. This committee arranges a course of study suited to the desires, needs, and previous attainments of the student, assists him in the choice of a subject for a thesis, passes judgment upon his thesis when it is written, conducts his examination, and, if he passes, reports him to the Council as worthy of the degree sought. The nature of the work prescribed, and of the committee's oversight, varies more or less according to the subject chosen, the degree sought, and the previous attainments of the student. The work may consist of attendance upon certain specified courses of study, of reading to be done privately and reported upon, or of an original research to be carried on more or less independently. The requirement of a thesis is sometimes waived in the case of a candidate for a *master's* degree. It may be added also that for the master's degree the Council may, at its discretion, approve a course of study which does not confine the candidate rigorously to a major and two minor studies.

Graduate students who do not wish to work for a higher degree are admitted to any course offered in the Department of Literature, Science, and the Arts, upon satisfying the professor in charge that they are qualified to pursue the work to advantage.

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## THE HIGHER DEGREES.

### Degrees Conferred.

The degrees conferred on the completion of approved courses of study in the Graduate School are those of Master of Arts, Master of Science, Doctor of Philosophy, and Doctor of Science.

### The Masters' Degrees.

A Bachelor of this University, or of any other reputable university or college, may become a candidate for a master's degree, and may be recommended for the degree after one year's residence at the University, provided he pass a satisfactory examination on the course of study approved by the Administrative Council. A thesis may, or may not, be included in the requirements for a degree, as the committee in charge of the student's work may determine.

The degree of Master of Arts is the one usually conferred, though candidates who pursue studies along scientific lines may, at their option, receive the degree of Master of Science.

The practice of allowing graduates of this University to enter upon studies *in absentia* as candidates for a master's degree, has been discontinued. But a graduate who has already completed a considerable portion of the term of residence prescribed for a master's degree, may be allowed to continue his studies for the degree, without further residence at the University, on such conditions as the Administrative Council may determine in each case. *This privilege is restricted to graduates of this University.*

A student properly qualified may be permitted to pursue at the same time studies for a master's degree and studies in any of the professional schools, on condition that the term of study and residence in the Graduate School be extended to cover at least two years.

### The Doctors' Degrees.

1. The doctors' degrees are open to all persons who have received a bachelor's degree, but no student will be accepted as a candidate for a doctor's degree who has not a knowledge of French and German sufficient for purposes of research. The degree of Doctor of Philosophy is the one usually conferred, though candidates who pursue studies along scientific lines may, at their option, receive the degree of Doctor of Science.

2. It is not intended that the doctor's degree shall be won merely by faithful and industrious work for a prescribed time in some assigned course of study, and no definite term of required residence can be



specified. As a rule, three years of graduate study will be necessary, the last two semesters of which must be spent at this University. The period of three years, however, may be shortened in the case of students who, as undergraduates, have pursued special studies in the direction of their proposed graduate work.

3. No student will be enrolled as a candidate for a doctor's degree until he has been in residence as a graduate student for at least one year. [This rule may be waived in the case of those who come properly accredited from a Graduate School of some other university, and of those who, as undergraduates in this University, have shown special proficiency in the line of their proposed graduate work.]

4. A student wishing to become a candidate for a doctor's degree must make a formal application to be so enrolled at least two semesters prior to the time for presenting himself for examination.

5. A candidate for a doctor's degree must take a major study that is substantially co-extensive with some one department of instruction in the University. He must also take two minor studies, one of which may be in the same department as the major, but involving a more thorough treatment of the same. Both minors must be cognate to the major, and all studies must be subject to the approval of the Administrative Council.

6. **THE THESIS.**—The thesis is of great importance. It must exhibit creditable literary workmanship and a good command of the resources of expression, but it must depend for acceptance more upon its subject-matter than upon its formal or rhetorical qualities. It must be an original contribution to scholarship or to scientific knowledge. The inquiry should be confined within narrow bounds. The treatment should be as concise as the nature of the subject permits, and show familiarity with the history of the problem treated, with the literature bearing upon it, and with the latest methods of research applicable to it. Every thesis should contain a clear introductory statement of what it is proposed to establish or investigate, and likewise a final résumé of results. It should also be accompanied by an index of contents and a bibliography of the subject. It is expected that the preparation of an acceptable thesis will usually require the greater part of an academic year.

### **Special Regulations Relating to the Higher Degrees.**

1. Applicants for an advanced degree are required to announce to the Council, through the Secretary, as early as the tenth of October of each year, the particular branches of study to which they wish to give special attention. The supervision of their work will then be entrusted to the proper committee.

2. The subject of the thesis for a doctor's degree must be chosen, and must be approved by the committee concerned, as early as the first of November of the college year in which the applicant expects to take his degree, and the subject of the thesis for a master's degree, when required, must be chosen and approved as early as the first of December.

3. The thesis must be completed and put into the hands of the chairman of the proper committee as early as the first of May of the year in which the applicant expects to take the degree.

4. The thesis must be prepared for close scrutiny with reference not only to its technical merits, but also to its merits as a specimen of literary workmanship. It must be preceded by an analytical table of contents, and a carefully prepared account of the authorities made use of.

5. The thesis must be read and defended in public at such time as the Council may appoint; and, in case of a master's degree, a bound copy, either written or printed, must be deposited in the University library.

6. Every candidate for the degree of Doctor of Philosophy or Doctor of Science, in case of the acceptance of his thesis, is required to have the thesis printed in full or in part as may be approved by the responsible committee. He is also required to deposit one hundred and fifty copies of the printed thesis in the University library, these copies to be used for exchange with other universities;—provided, however, that in cases where this requirement would work hardship, it may be waived on recommendation of the candidate's committee. To guarantee the printing of the thesis, every candidate for the doctor's degree is required to deposit with the Treasurer of the University, between the date of the acceptance of the thesis and the time fixed for his examination, the sum of fifty dollars, which deposit will be returned to him in case of failure to pass his examination, or whenever he shall cause his thesis to be printed at his own expense, or shall have it published in a form and under auspices approved by the responsible committee. In case the thesis is not immediately printed, a type-written copy must be placed in the University library.

In the printing of the thesis at his own expense the candidate will be expected to use good substantial paper and slightly typography. A page four inches by six, with outside margins of at least one inch, is recommended.

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## ADMISSION AND REGISTRATION.

All applicants for admission to the Graduate School must first report to the Dean of the Department of Literature, Science, and the Arts, and present their credentials. They will then be referred to the Secretary of the Administrative Council for the arrangement of courses of study.

The privileges of the school are open to graduates of the Department of Literature, Science, and the Arts of this University, and to graduates of other universities and colleges who satisfy the Administrative Council that they are qualified to pursue with profit the advanced courses of study offered in the school.

Graduates of institutions where the undergraduate courses of study are not substantially equivalent to the course prescribed at this University are ordinarily required to do an additional amount of undergraduate work, or to prolong their term of residence, before being admitted to full candidacy for a higher degree.

Graduates of this University, or of other institutions, who do not wish to become candidates for a degree, may be admitted and registered as special resident graduates.

Graduates of other institutions who are candidates for a bachelor's degree in the Department of Literature, Science, and the Arts, are not registered in the Graduate School.

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## FEES AND EXPENSES.

**Matriculation Fee.**—Every student before entering any department of the University is required to pay a matriculation fee. This fee, which for citizens of Michigan, is ten dollars, and for those who come from any other state or country, twenty-five dollars, is paid but once, and entitles the student to the privileges of permanent membership in the University.

**Annual Fee.**—In addition to the matriculation fee, every student has to pay an annual fee for incidental expenses: This fee in the Department of Literature, Science, and the Arts is, for Michigan students thirty dollars; for all others, forty dollars. It is paid the first year of residence at the University, and every year of residence thereafter. Resident graduates are required to pay the same annual fee as undergraduates. Graduate students studying *in absentia* for a master's degree pay an annual fee of ten dollars.

The matriculation fee and the annual fee must be paid at the beginning of the academic year. A by-law of the Board of Regents provides that no student or graduate shall be allowed to enjoy the privileges of the University until he has paid all fees that are due.

**Laboratory Expenses.**—Students who pursue laboratory courses of study are required to pay for the materials and apparatus actually consumed by them. The deposits required in advance are different in the different courses, ranging from one to twenty dollars. The laboratory expenses of students will vary with their prudence and economy.

Experience has shown that in the chemical laboratory the average expense for all courses is about one dollar and twenty cents a week.

**Diploma Fee.**—The fee for the diploma given on graduation is ten dollars, and the by-laws of the Board of Regents prescribe that no person shall be recommended for a degree until he has paid all dues, including the fee for diploma.

**Other Expenses.**—Students obtain board and lodging in private families for from three to five dollars a week. Clubs are also formed in which the cost of board is from one dollar and a half to two dollars and a half a week. Room rent varies from one dollar to three dollars a week for each student. The annual expenses of students, including clothing and incidentals, are, on the average, about three hundred and seventy dollars. Students on arriving in Ann Arbor can obtain information in regard to rooms and board by calling at the office of the Secretary of the University in University Hall.

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## FELLOWSHIPS.

### **Elisha Jones Classical Fellowship.**

In 1889 the Elisha Jones Classical Fellowship was established by Mrs. Catherine E. Jones, in memory of her husband, Professor Elisha Jones, a graduate of this University, in the class of 1859, and for many years a member of the Literary Faculty. Its purpose is "to encourage patient, honest, accurate study of the languages, literature, and archæology of ancient Greece and Rome."

A candidate for this Fellowship must have spent at least three entire semesters as a student in this Department of the University and must be a Bachelor of Arts of this University, of not more than two years' standing. Appointments to the Fellowship are made by an Examining Board, consisting of President ANGELL and Professors D'OUGE, KELSEY, HUDSON, and PATTENGILL. The period of incumbency is limited to two academic years, and must be spent at this University "unless at any time the examining board shall see fit to allow the second year to be spent" at some other place favorable to classical study.

The present holder of the Fellowship is Walter David Hadzsits, A.M.

### **Fellowship in Chemistry.**

The sum of five hundred dollars has been given by Messrs. Parke, Davis and Company, of Detroit, for the continuation in the year 1900-1901 of the Fellowship in Chemistry established by them in 1895. Professors VAUGHAN, PRESCOTT, and FREER have been designated to act as a committee to select the incumbent and to arrange the work in

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accordance with the wishes of the donors. The holder of the Fellowship for the current year is Ralph Hugh Page, B.S.

**Peter White Fellowship.**

Provision for a Fellowship in American History for the year 1900-1901, with an income of four hundred dollars, has been made by Honorable Peter White, of Marquette. The present holder of the fellowship is Harlow Stafford Person, Ph.B.

**Dexter M. Ferry Botanical Fellowship.**

Provision for a Fellowship in Botany for the year 1900-1901, with an income of five hundred dollars, has been made by Mr. Dexter M. Ferry, of Detroit. The present holder of the Fellowship is John William Tell Duvel, B.S.

**Stearns Fellowship.**

The sum of three hundred and fifty dollars has been given by Messrs. Frederick Stearns and Company, of Detroit, for the continuation in the year 1900-1901 of the fellowship in pharmaceutical chemistry established by them in 1895. The subject of research for next year will be the chemical constitution of the alkaloids of plants grown in the University Botanical Gardens. The holder of the fellowship for the current year is Paul Merrill, Ph.D.

**Gas Engineering Fellowship.**

Members of the Michigan State Gas Association have subscribed the sum of six hundred dollars for the support of a fellowship in gas engineering during the year 1900-1901, five hundred dollars of this sum to be given to the holder of the fellowship, the remainder to be expended for special apparatus and material required for the research.

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**COURSES OF INSTRUCTION.**

The following list of advanced courses does not attempt in all cases to discriminate graduate from undergraduate instruction; the reason being that the possession of a bachelor's degree may mean much or little as regards a student's proficiency in a particular subject. With a few exceptions, the courses here mentioned all presuppose a somewhat extensive preliminary study of the subject, a study covering from one to six or more years according to the circumstances. In some instances the attempt is made to indicate, in terms of both time and work, the amount of preparation required for entrance upon the courses described. Many of the courses are advanced electives which are open to undergraduates,

but have been shown by experience to be suited to the needs of many graduates. Different departments of instruction have adopted different modes of announcing their work. For further information reference may be made directly to the head of the department concerned.

### Greek.

The courses here announced presuppose, in general, four years previous study of Greek, viz., the usual preparatory course of two years, and two years of collegiate study devoted to the history of Greek literature and to reading from Lysias, Xenophon, Homer, Demosthenes, the Tragic Poets, and Aristophanes.

Professor D'OUGE:—

#### Teachers' Course.

This course is intended to give students who expect to teach Greek training in teaching the elements of inflection and syntax. Lectures are given on the chief results of the modern comparative treatment of Greek sounds and inflections.—*Two hours a week, first semester.*

#### The History of Greek Art from the beginning to the Roman Period.

Gardner's Handbook of Greek Sculpture and Collignon's Manual of Greek Archæology are made the basis of a more general study.—*Three hours a week, first semester.*

#### Seminary in Tragedy.

Several of the representative plays of Euripides will be read, with special reference to the dramatic art of the poet, his relation to his own times, his metres, and his dramatic innovations.—*Three hours a week, first semester.*

#### The Nicomachean Ethics of Aristotle, Books I–IV and X.

*Two hours a week, first semester.*

#### Pindar: the Olympian and Pythian Odes, and Bacchylides.

*Three hours a week, second semester.*

#### Greek Antiquities.

Lectures on the monuments and the private life of the ancient Athenians. Illustrated by stereopticon views.—*One hour a week, second semester.*

#### [Introduction to Homer.

A study of the peculiarities of the epic dialect and the Homeric verse. Intended especially for those who expect to teach Greek.—

*Three hours a week, second semester.* This course is omitted in 1900-1901.]

[Lucian.

A course in rapid reading and a study of the life and times of the writer.—*Two hours a week, second semester.* This course is omitted in 1900-1901.]

[The Greek Dialects.

Reading of Cauer's *Delectus Inscriptionum Graecarum*.—*Two hours a week, second semester.* This course is omitted in 1900-1901.]

The Athenian Constitution of Aristotle.

With special reference to the judicial and political antiquities of Athens.—*Two hours a week, second semester.*

Professor PATTENGILL:—

[Studies in Plato.

The Symposium and other dialogues will be interpreted.—*Three hours a week, first semester.* This course is omitted in 1900-1901.]

Thucydides, Books VII and VIII.

*Three hours a week, first semester.*

Theocritus, Bion, and Moschus.

*Three hours a week, second semester.*

[The Greek Minor Poets.

*Three hours a week, second semester.* This course is omitted in 1900-1901.]

Dr. WAIT:—

Introduction to Greek Epigraphy, and Reading of Inscriptions.

*Two hours a week, first semester.*

Teachers' Course.

Greek writing.—*Two hours a week, second semester.*

THE CLASSICAL FACULTY:—

Reports on Classical Philology.

Throughout the year members of the Classical Faculty and the graduate students meet *once a week* to present and to hear analyses and reviews in the domain of the Greek and Latin languages and literatures, and reports of recent researches and explorations in Greek and Roman archaeology, history, and antiquities.

### Latin.

The courses here announced presuppose, in general, seven or eight years' previous study of Latin, viz., the usual preparatory course of four years, and three or four years of collegiate study devoted to Livy, Cicero, Horace, Terence, Latin writing, and the systematic study of Roman literature.

The courses in ancient philosophy (see pages 35-38) and the course in the Principles of Linguistic Science (see page 28-29) are strongly recommended to classical students.

Professor KELSEY:—

#### [Caesar's Gallic War ('Teachers' Course, A).

Lectures. Papers prepared by those taking the course. Critical study of the text of the Gallic War, on the basis of Meusel's edition; studies in the syntax and military antiquities.—*Five hours a week, first semester.*]

#### [Introduction to Classical Philology.

Lectures. A brief outline of the history and present condition of classical studies is presented, followed by an extended discussion of the methods employed in classical philology. Attention is also paid to the bibliography of the subject.—*Three hours a week, second semester.*]

#### [Introduction to Roman Archæology.

Lectures on the architecture and topography of Ancient Rome, and on sculpture and painting in the Roman period. This course will be illustrated by photographs, engravings, and the occasional use of stereopticon slides.—*Four hours a week, second semester.* Professor KELSEY's courses are omitted in 1900-1901.]

Professor ROLFE:—

#### Cicero ('Teachers' Course, B).

Critical reading of selected orations of Cicero, with studies in rhetorical analysis and style.—*Three hours a week, first semester.*

#### Latin Seminary: The Satires of Horace.

Open to graduate students only.—*Two hours a week, throughout the year.*

#### The Letters of Pliny the Younger.

Interpretation of selected letters, with a study of Roman life and society at the end of the first century, A. D.—*Three hours a week, first semester.*



## [Latin Grammar.

Lectures on the phonology and morphology of the Latin language, with an outline of the syntax scientifically considered.—*Three hours a week, first semester.* This course is omitted in 1900-1901.]

## Virgil (Teachers' Course, C).

Critical study of select portions of the *Bucolics*, *Georgics*, and *Aeneid*, on the basis of Ribbeck's large edition.—*Three hours a week, second semester.*

## Latin Inscriptions.

Reading of inscriptions of different periods from squeezes and facsimiles. Interpretation of inscriptions.—*Three hours a week, second semester.*

## Proseminary in Latin Grammar.

Studies in Latin Syntax.—*Two hours a week, second semester.*

## [The Italic Dialects.

Lectures on the phonology and morphology of the dialects, with the interpretation of selected inscriptions.—*Two hours a week, second semester.* This course is omitted in 1900-1901.]

## Professor ROLFE and Assistant Professor DRAKE:—

## Studies in Cicero.

Syntax and Political Antiquities. *Two hours a week, first semester.*

## Reports on the Progress of Research.

Analysis and criticism of important articles in the domain of the Latin language and literature, Latin grammar and lexicography, Roman history, and Roman archæology and antiquities, by members of the Faculty and members of the Latin Seminary.—*Two hours a week, throughout the year.*

## Assistant Professor DRAKE:—

## History of Roman Law.

Lectures. A sketch of the development of Roman Private Law, and of the relations of Private to Public Law up to the death of Justinian; some account of Roman Law in the Middle Ages; and a discussion of the relations of Roman Law to modern systems of law.—*One hour a week, first semester.*

### The Development of the Roman Constitution.

Lectures. This course deals with the Roman constitution up to and including the Augustan age. Special attention will be given to the reason for the failure of the constitution of the Republic, and to the establishment of the Principate by Augustus. Points of resemblance to the American constitution will be noted whenever it is possible.—*Two hours a week, first semester.*

### [The Germania and Agricola of Tacitus.

Interpretations and lectures.—*Two hours a week, first semester.*  
This course is omitted in 1900-1901.]

### Roman Law.

Lectures. An outline of the fundamental principles of Roman Law as given in the institutes of Gaius and of Justinian. Special emphasis will be placed on points of Roman Law which illustrate principles of English Law.—*Two hours a week, second semester.*

### Roman Provincial Administration.

Lectures. A short account will be given of the geographical extension of Rome through her conquests, of her system of provincial administration, of the effect of provincial development upon the life of the state, of the reorganization of the administration by Augustus and by Diocletian, and a sketch of the later history of the provinces.—*Two hours a week, second semester.*

### [Historical Proseminary.

Study of historical subjects from the sources: The age of Diocletian.—*Two hours a week, second semester.* This course is omitted in 1900-1901.]

Dr. SANDERS and Dr. MEADER:—

### Latin Writing (A).

Attention is given not only to correctness of expression, but also to matters of style and the finer distinctions of the language.—*Two hours a week, first semester.*

### Latin Writing (B).

Lectures on Latin style, with collateral reading and written exercises.—*Three hours a week, second semester.*

Dr. SANDERS:—

### Introduction to Latin Palæography.

Lectures on the various styles of writing found in Latin manuscripts, with exercises in reading from facsimiles.—*Two hours a week, first semester.*

### Catullus, Tibullus, and Propertius.

Interpretations, with lectures on the Roman elegy.—*Three hours a week, second semester.*

Dr. MEADER:—

### Christian Latin.

Interpretation of selections from the early Latin writers of the Christian church, with illustrative lectures upon Christian archæology and antiquities.—*Three hours a week, second semester.*

### Sanskrit.

Before beginning the study of Sanskrit, the student should have pursued courses in Greek and Latin for at least four semesters or, instead of either Greek or Latin, Germanics of the early period.

Dr. WAIT:—

### Beginners' Course.

Grammar, and exercises in translation and composition. Text-books: Perry's Sanskrit Primer and Whitney's Grammar.—*Three hours a week, first semester.*

### Second Course.

Interpretation of the prose selections contained in Lanman's Sanskrit Reader, with elementary studies in the comparative morphology of the more important cognate languages.—*Three hours a week, second semester.*

### Semitics.

The courses in Semitics are intended for:—(1) students who are seeking a liberal culture; (2) students of "classical" and modern languages, to furnish them with *necessary* data for the study of the philosophy of language and phonetic laws; (3) students who wish to make a special study of Semitics (the courses leading to the degree of Doctor of Philosophy); (4) students of ancient history; (5) students of art and archæology; (6) students of ethics and theology.

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Professor CRAIG:—

Hebrew.\*

1. Genesis. Baer and Delitzsch's Text. Gesenius' Hebrew Grammar by Kautzsch, trans. by Collins, 26th Edition. Craig's Hebrew Word Manual.—*Three hours a week, first semester.*

2. Deuteronomy, Joshua, I Samuel, Ruth, Jonah. Theile's Biblia Hebraica. Davies's Lexicon.—*Three hours a week, second semester.*

3. Prophetic Literature: Amos and Isaiah. Study of the nature and content of prophecy in its literary, historical, and ethical aspects. Text-books: Hebrew Bible, Driver's Hebrew Moods and Tenses.—*Two hours a week, first semester.*

4. The Book of Job, including study of the literary structure and critique of the dominant ideas. Baer and Delitzsch's Text and Haupt's Polychrome Edition (text by Siegfried.)—*Two hours a week, second semester.*

Assyrian.

1. Introduction to Easy Historical Inscriptions from the Ninth Century, B. C., with study of the grammar. Text-books: Delitzsch's Assyrische Lesestücke, dritte Auflage.—*Three hours a week, first semester.*

2. Historical Inscriptions. Selections from the Cuneiform Inscriptions of Western Asia (R. I–V).—*Second semester.*

3. The Babylonian Stories of Creation, the Deluge, and the War of Marduk against Tiamat, with lectures on the Cosmology of the Babylonians. Inscription of Tiglathpileser I, circa 1120 B. C.—*Two hours a week, first semester.*

4. Religious Literature. King's "The Prayers of the Lifting-up of the Hand." Craig's "Religious Texts."—*Second semester.*

5. Seminary in Sumerian.—*Two hours a week, first semester.*

History and Archæology.

Lectures on the Ancient Babylonians, Assyrians, Hebrews, Phoenicians. The lectures are based on the study of the monuments.—*Two hours a week, second semester.*

Arabic.

1. Introductory Course. Grammar and reading. Socin's Arabic Grammar (English edition) and Brünnow's Chrestomathy.—*Two hours a week, first semester.*

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\* Candidates for a higher degree who wish to elect a Semitic language as one of the subjects leading to the degree, must have previously completed Courses 1 and 2 in Hebrew, or an equivalent thereto in some Semitic language.

2. Selected Suras from the Quran, Chrestomathia Qurani Arabica, Nallino, with introductory lectures on the life of Muhammed and Muhammedanism.—*Two hours a week, first semester.*

### **Aramaic, Syriac, Ethiopic.**

Courses in Aramaic, Syriac, Ethiopic are arranged to suit the needs of advanced students.

### **Hellenistic Greek.**

Professor CRAIG:—

#### **New Testament.**

Gospel of John, including grammatical study of the peculiarities of Hellenistic Greek, and historical introduction to the book. Text-Books: Westcott and Hort's Greek New Testament, revised edition with introduction by Ph. Schaff; Thayer's Winer's New Testament Grammar; Blass' Grammar of New Testament Greek; Thayer's Greek-English Lexicon.—*Two hours a week, first semester.*

#### **Septuagint.**

Introductory lectures with selected readings from the historical and prophetic books. Apocrypha; Maccabees, Books I and II. Text-books: Vetus Testamentum Græce by L. Van Ess, or The Old Testament in Greek by H. B. Swete, Vols. I-III. Grammar and lexicon as in the first semester, and Liddell and Scott's Lexicon.—*Two hours a week, second semester.*

### **French.**

The advanced and graduate courses here described presuppose in the student a reasonable knowledge of the spoken and written language and an acquaintance with modern French literature, such as are to be obtained from Courses 1, 2, 3, 4, 5, and 6, described in the University Calendar for 1899-1900, pages 63 to 65.

Courses 5 and 6, mentioned above, offered by Assistant Professor de Pont and Mr. François in the first and second semesters respectively, are advanced practical courses in French composition and style, and are especially recommended to those who intend to devote themselves to teaching French.

Professor CANFIELD:—

#### **Molière.**

A careful study of his chief comedies and a survey of his ideas and his art.—*Two hours a week, first semester.*

### Poetry of the Nineteenth Century.

Lamartine, Musset, Vigny, Hugo.—*Three hours a week, first semester; two hours a week, second semester.*

### Rousseau.

Reading of selected works, reports and lectures.—*Two hours a week, second semester.*

### The Growth of Realism in the Nineteenth Century, especially in the Novel.

Lectures and assigned reading.—*Three times a week, second semester.*

### Proseminary in French Literature.

Literary Criticism before the rise of Romanticism.—*Two hours a week, first semester.*

### Assistant Professor DE PONT:—

#### Dramatists of the Eighteenth Century.

Lectures and reports. This course is designed to furnish a survey of the French drama from the Classical to the Romantic School.—*Two hours a week, second semester.*

### Assistant Professor DE PONT and Mr. FRANÇOIS:—

#### Prose writers of the Eighteenth Century.

Montesquieu; Voltaire; Diderot.—*Two hours a week, second semester.*

### Assistant Professor LEVI:—

#### History of French Literature in the Seventeenth, Eighteenth, and Nineteenth Centuries.

A general survey. Lectures, reports, reading.—*Two hours a week, throughout the year.*

#### Victor Hugo's Novels.

Lectures, readings and reports.—*Two hours a week, first semester.*

### Assistant Professor LEVI and Mr. FRANÇOIS:—

#### The Classic Drama: Corneille and Racine.

Recitations, reports, lectures.—*Two hours a week, first semester.*

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Assistant Professor BOURLAND:

Historical French Grammar.

Lectures on phonology and morphology, with practical exercises in reading Old French, and collateral reading.—*Two hours a week, throughout the year.*

[History of French literature to the End of the Fifteenth Century.

Lectures, reading and reports.—*Two hours a week, first semester.*  
This course is omitted in 1900-1901.]

Dr. EFFINGER:—

The Dramatic Literature of the Nineteenth Century.

This course will comprehend a study of the drama in the nineteenth century, beginning with the theatre of the Revolution and the melodrama, and covering the romantic movement, the classical reaction, and the rise of the modern school.—*Three hours a week, throughout the year.*

Dr. THIEME:—

French Literature of the Sixteenth Century.

This course treats the transitions from the Middle Ages to the Renaissance and from the Sixteenth to the Seventeenth Century, with special study of Marot, Ronsard, Rabelais, Montaigne, Calvin, Jodelle, Garnier, and Hardy. Lectures, reading, reports.—*Three hours a week, first semester.*

French Literary Criticism in the Nineteenth Century.

The principles of literary criticism before Sainte-Beuve. Study of Sainte-Beuve, Taine, and Brunetière.—*Three hours a week, second semester.*

Mr. FRANÇOIS:—

Classic French Prose.

Pascal; La Bruyère; Bossuet; Sévigné; Saint-Simon; La Rochefoucauld. Recitations with lectures and reports.—*Two hours a week, first semester.*

### Provençal.

[Assistant Professor BOURLAND:—

Outline of the Grammar, with readings in Appel's *Provençalische Chrestomathie*.—*Two hours a week, second semester.* This course is omitted in 1900-1901.]

### Italian.

The minimum requirement for admission to the courses announced below consists in courses 1 and 2 described in the University Calendar for 1899-1900, page 65, or an equivalent.

Assistant Professor LEVI:—

Dante: *La Vita Nuova*.

*One hour a week, first semester.*

Dante: *La Divina Commedia*.

Lectures on the life and works of Dante, with special reference to the interpretation of the Divine Comedy. Recitations and reports on assigned reading.—*Three hours a week, second semester.*

### Spanish.

The minimum requirement for entrance to the advanced courses in Spanish, announced below, consists in Courses 1 and 2 described in the University Calendar for 1899-1900, page 65, or an equivalent.

Assistant Professor BOURLAND:—

Cervantes: *Novelas Ejemplares*.

*Two hours a week, first semester.*

[The Classic Drama.

Lope, Tirso, Calderon.—*Two hours a week, second semester.* This course is omitted in 1900-1901.]

History of Spanish Literature in the Sixteenth and Seventeenth Centuries.

Lectures and readings.—*Two hours a week, second semester.*

### German.

The advanced and graduate courses in German, announced below, presuppose a reasonably thorough and extended knowledge of the written and spoken language, and an acquaintance with some of the master-



pieces of modern German literature, both of which may be obtained from the undergraduate work not here mentioned. The minimum requirement of undergraduate preparation for the graduate courses consists in Courses 1, 2, 3, 4, 5<sub>1</sub>, 6<sub>1</sub>, and options in 5<sub>a</sub>, 5<sub>b</sub>, 6<sub>a</sub>, and 6<sub>b</sub>, as described in the University Calendar for 1899-1900, pages 65 to 68, or work equivalent to the courses mentioned.

Courses 5<sub>a</sub>, 5<sub>b</sub>, 6<sub>a</sub>, and 6<sub>b</sub> are primarily intended for undergraduates, and are recommended for graduates who wish to study the chief dramas of the classical period.

Assistant Professor WINKLER:—

### Goethe's Faust.

Lectures and recitations. Thomas' edition. The drama is studied as a work of art, and the life and thoughts of Goethe, affording the basis for its interpretation, are carefully reviewed and analyzed. An excellent Goethe library, which contains the most important critical material on Faust, affords ample opportunity for special study. Advanced course open to undergraduates and graduates.—*Two hours a week, throughout the year.*

### History of German Literature.

Lectures and readings from Max Müller's German Classics. A survey of German literature in its development from the beginnings down to the death of Goethe, with special regard to important epochs, notable literary monuments, and underlying intellectual movements. Vogt and Koch, *Geschichte der deutschen Literatur von den ältesten Zeiten bis zur Gegenwart*. Francke, *Social Forces in German Literature*. Advanced course open to undergraduates and graduates. II. Modern Period. *Three hours a week, second semester.*

### German Romanticism.

Lectures and assigned readings. The beginnings of German Romanticism. Influence of Kant, Fichte, and Schelling upon the Romantic movement. Its relation to German Classicism and to the social and political life of the times. The younger Romantic movement. The period of the wars of liberation. The intellectual movement leading to the revolution of 1848. Advanced course open to undergraduates and graduates.—*Two hours a week, throughout the year.*

### Proseminary in Modern German Literature.

The Storm and Stress Movement. Study of the sources, and the social and literary conditions of Germany, that gave rise to the movement. Reports, discussions, and lectures. Primarily for graduates.—*Two hours a week, first semester.*

### Assistant Professor MENSEL:

#### History of German Literature.

Period I. From the earliest time to the end of the Middle Ages.—  
*Two hours a week, first semester.*

#### Middle High German.

Lectures and recitations with assigned readings. This course is intended to serve as an introduction to Middle High German; incidentally it includes a brief sketch of the historical development of Modern German phonology and inflection. The selections read are drawn from homiletic prose, folk-epic, court-epic, and lyric; and in the translation of these into Modern German special attention is paid to the principles underlying change in the word-signification. Paul, *Mittelhochdeutsche Grammatik*, 4te Aufl., and Bachmann, *Mittelhochdeutsches Lesebuch*. Advanced course open to undergraduates and graduates.—*Three hours a week, first semester.*

#### The Middle High German Folk-Epic.

Lectures with collateral readings on the characteristic features, composition, legendary setting, language, and metre of the folk-epic. Reading and interpretation of selections from the *Nibelungenlied*, *Gudrun*, and minor epics. Reports on assigned topics. Advanced course open to undergraduates and graduates.—*Two hours a week, second semester.*

#### Introductory Course in Old High German:—

Lectures based upon Braune's *Abriss der althochdeutschen Lautlehre*, 2te Aufl., and readings from Braune's *Althochdeutsches Lesebuch*, 4te Aufl. The course will include a review of the history of the literature of the period. Primarily for graduates.—*Two hours a week, first semester.*

#### Proseminary in Old High German.

Special studies in the style of Isidor and the Monsee Fragments. Primarily for graduates.—*Two hours a week, second semester.*

### Dr. DIEKHOF:

#### German Syntax.

Lectures and reports on assigned topics. Wunderlich, *Der deutsche Satzbau*, and Erdmann-Mensing, *Grundzüge der deutschen Syntax*. Advanced course open to undergraduates and graduates.—*Three hours a week, second semester.*

Dr. ROEDDER:—

**German Mythology.**

Lectures and reports on assigned topics. Klee's *Deutsche Mythologie*. Advanced course open to undergraduates and graduates.—*Two hours a week, second semester.*

Dr. FLORER:—

**Life and Works of Luther.**

Lectures and reports. Special attention is paid to Luther's language. Advanced course open to undergraduates and graduates.—*Two hours a week, second semester.*

Dr. BOUCKE:—

**The History of German Civilization.**

Lectures and readings from Gustav Freytag's *Bilder aus der deutschen Vergangenheit*. This course is intended to supplement the course on German literature, and to give a survey of the historical development of German culture in its various expressions, up to the beginning of this century, with special regard to the more important epochs. Advanced course open to undergraduates and graduates.—*Two hours a week, throughout the year.*

**Gothic.**

Assistant Professor MENSEL:

**Introductory Course.**

Lectures on phonology and morphology, and reading of the Gospels. Streitberg's *Gotisches Elementarbuch*. This course serves as an introduction to the study of Germanic Philology. Primarily for graduates.—*Two hours a week, first semester.*

**Advanced Course.**

The Epistles. Heyne's *Ulfilas*, 9te Aufl. Primarily for graduates.—*Two hours a week, second semester.*

**Scandinavian.**

**[Old Icelandic.**

Introductory course. Lectures and reading of selections from the Sagas. Kahle's *Altisländisches Elementarbuch*. Primarily for graduates.—*Two hours a week. Omitted in 1900-1901.]*

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### English Philology and General Linguistics.

The work of this department is concerned with the study of (1) the mother tongue, (2) the life and growth of language in general, and (3) the teaching of language.

Professor HEMPL:—

#### Old English.\*

A general introduction to the subject.—*Four hours a week, first semester.*

#### [Old-English Phonology and Morphology.

This course consists of lectures on the history of Old-English sounds and forms, together with the private reading of Old-English prose texts and the investigation of two or three problems.—*Two hours a week, second semester.* Omitted in 1900–1901.]

#### [Old-English Syntax.

The investigation of specific problems, together with a brief general survey of the subject.—*Two hours a week, first semester.* Omitted in 1900–1901.]

#### Old-English Poetry.

It is the object of this course to make the student familiar with the most important poetical literature of the Old-English period.—*Two hours a week, second semester.*

#### Middle English.

This course consists of a brief introduction to the subject, the private reading of several of Chaucer's works, and the study of some of the more important questions of Chaucer's workmanship.—*Two hours a week, first semester.*

#### The History of the English Language.

Lectures on the most important factors in the history of the language, together with the investigation of the cause and process of certain changes in usage.—*Two hours a week, first semester.*

#### Modern-English Grammar.

This course is intended specially for candidates preparing to teach English.—*Two hours a week, second semester.*

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\* The term "Old English" is used in this Announcement for the period of English often called "Anglo-Saxon."

## Spoken English.

A study of colloquial English as distinguished from the English of books and artificial speech, and the investigation of the more important facts as to the fortunes of English speech in America.—*Two hours a week, second semester.*

## The Elements of Phonetics.

A study of the elements of speech-sounds, with special reference to the needs of candidates preparing to teach modern languages.—*Two hours a week, first semester.*

## The Teaching of Modern Foreign Languages.

It is the object in this course to give practical instruction in the teaching of modern foreign languages, as well as advice in the matter of preparation for teaching. There will also be given a brief survey of the most important methods now employed.—*Two hours a week, second semester.*

## The Principles of Linguistic Science.

Lectures on the most important phases of the life and growth of language. It is the object in this course to furnish to students of either classical or modern languages an explanation of the phenomena of the languages they are studying, and to bring these scattered data into connection with the underlying principles.—*Two hours a week, second semester.*

### **English and Rhetoric.**

The advanced work of this department proceeds along two main lines:—English and American Literature, and Rhetoric. Advanced courses in Oratory are also offered in connection with this department.

The following courses (open also to undergraduates who are prepared to take them) will ordinarily be found adapted to the needs of graduate students. In case of students who have specialized in English for their first degree, additional advanced courses for graduate study are provided after conference with the candidate. Some of the courses given in recent years are the following: The Development of the English Novel; The English Satirists of the Seventeenth and Eighteenth Centuries; The Romantic Revival in England at the close of the last century; The Pre-Shakespearian Drama in England; Shakespeare's Histories.

See also the courses in English Philology and General Linguistics on pages 28 and 29.

## Professor DEMMON:—

## English Literature Seminary.

Each student is expected, first, to present two papers during the semester, one an essay upon an assigned masterpiece, the other a critique of a fellow-student's essay; second, to participate each week in a general *ex tempore* discussion of the work under consideration; third, to read the entire list of works with which the course deals, together with such critical literature on each subject as there may be time for. The aim of the course is to lay a foundation for correctly estimating literary masterpieces of widely varying types. The list of masterpieces is as follows: More's Utopia; Bacon's Essays; Milton's Areopagitica; Carlyle's Sartor Resartus; George Eliot's Silas Marner; Spenser's Faery Queen, Book I; Shakespeare's Sonnets; Milton's Paradise Lost; Dryden's Absalom and Achitophel; Pope's Essay on Man; Wordsworth's Excursion; Browning's Soul Tragedy; Tennyson's Maud; Swinburne's Atalanta in Calydon.—*First semester.*

## Shakespeare Seminary.

The method is similar to that in the preceding course. The plays selected are: A Midsummer Night's Dream; The Merchant of Venice; As You Like It; Twelfth Night; The Tempest; Richard III; the two parts of Henry IV; Romeo and Juliet; Hamlet; Othello; King Lear; Macbeth; Coriolanus.—*Second semester.*

## American Literature Seminary.

Authors studied: Irving, Cooper, Bryant, Emerson, Hawthorne, Longfellow, Whittier, Poe, Holmes, Thoreau, Lowell, Bayard Taylor, Howells, and James. Representative works of the authors named are studied, and an attempt is made to discover the distinctly American element by a comparative study with British authors.—*Second semester.* When this subject is taken for an advanced degree, individual work is assigned for the first semester, upon which the candidate is expected to make weekly reports.

## Principles of Criticism.

Lectures. Candidates who take their major in English Literature are expected to take this course in connection with the seminary work in English Literature and Shakespeare.—*Throughout the year.*

## Studies in the text of Shakespeare.

The aim will be to illustrate the methods of textual study as applied to a play like Hamlet, and the difficulties to be overcome in

establishing a text. The McMillan Shakespeare Library affords a very full apparatus for these studies.—*Two hours a week, first semester.*

### Professor SCOTT.

#### Development of Rhetorical Theory.

A historical and comparative study of the growth of rhetorical theory from Aristotle to the present time.—*First semester.*

#### Principles of Style.

Inductive study of masterpieces of English prose, with a view to verifying rhetorical principles. Lectures, readings, discussions.—*Second semester.*

#### Teachers' Course.

Methods of teaching English Composition and Rhetoric.—*Second semester.*

The course includes (1) a discussion of the principles—*aesthetic, psychological, and sociological*—which underlie the most notable theories of rhetoric and composition; (2) an application of these principles to certain urgent problems in the teaching of English; (3) practical suggestions with reference to the planning and management of composition work in secondary schools; (4) a critical examination of recent textbooks.

### Professor TRUEBLOOD:—

#### Study of Great Orators, ancient and modern.

Lectures on methods of public address and source of power. Study of representative selections. The method is similar to that in the English Literature Seminary.—*Throughout the year.*

#### Oral Discussions.

This course is designed to develop readiness of extemporization. It involves the application of the principles of formal logic and elocution in the discussion of leading topics of the day. Students are required to present briefs of the subjects discussed.—*Throughout the year.*

#### Music.

Courses are given in the University, but not here enumerated, that provide instruction in the science and practice of choral music, the science of harmony, and simple and double counterpoint. The courses named below are intended for graduate students.

Professor STANLEY:—

Canon and Fugue.

*Two hours a week, throughout the year.*

Musical Form.

*Two hours a week, throughout the year.*

Free Composition.

*Two hours a week, throughout the year.*

Instrumentation.

*Two hours a week, throughout the year.*

Original work in research will be required of candidates for a doctor's degree, who take music as one of their subjects.

### History.

The graduate work described below presupposes such information and training as is represented by undergraduate Courses 1, 2, and 3, as described in the University Calendar for 1899-1900, pages 74 to 76, supplemented by one or more advanced undergraduate courses. In indicating the courses named below as adapted to the needs of graduate students, it is not intended to exclude other advanced undergraduate courses, especially those in English constitutional history, in mediæval history, and in American colonial history, which, in certain cases, graduate students will be asked to take.

A large part of the work of the graduate student will consist of individual research and investigation carried on under the personal supervision of the professor in charge. To insure such supervision, two seminaries have been organized primarily for graduates. The work of these seminaries has been so arranged that the same student may remain a member of the seminary for two or more years. In the library building are seminary rooms in which graduate students may carry on their work. In these rooms is shelved the Hagerman collection of books on history and political science, including many works to which the student has frequent occasion to refer. As occasion requires, books in special lines are placed in the seminary rooms for the use of advanced students, and everything is done to make the library serve the purpose of research.

Professor HUDSON:—

The History of Europe since the Treaty of Westphalia.

This period is covered by two courses, each three hours a week. The course given the first semester comes down to the close of the



French Revolution, and is followed the second semester by a course dealing with the history of Europe since the Peace of Vienna.

### Present Problems of European Politics.

In a course given the first semester, three hours a week, a study is made of the relations of the Powers as they are affected by Asiatic and African questions and by the decline of the Ottoman Empire. Research courses are also given in the same field, each two hours a week, the course of the first semester dealing with the decline of the Ottoman Empire and the problems which it involves, while in that of the second semester a study is made of the decay of China and the advance of Russia in the far east.

### Political Institutions.

A course given the second semester, three hours a week, deals with the political institutions of England, France, Germany, and Switzerland.

Professor McLAUGHLIN:—

### The Political and Constitutional History of the United States, 1776-1861.

The purpose of this course is the careful study of the origin of the Constitution, its interpretation in history, the development of our political system, and the growth and tendencies of political parties. The work is based upon lectures and the careful examination of prescribed texts. The student is expected also to read in the library and to form a wide acquaintance with the secondary, and with some of the primary authorities. Weekly reports on the reading are required. Those who have not had a thorough course in colonial history will find it desirable to take undergraduate Course 13 (University Calendar for 1890-1900, page 76) in connection with this course.—*Three times a week, throughout the year.*

### Seminary in American History.

The aim of the seminary is to guide and direct the student in the use of primary authorities and to give instruction in methods of research. Special subjects of investigation are assigned to members of the seminary, and regular reports are made. Students at work upon theses are expected to report difficulties and successes, and are guided in their work. During a portion of the year the more important constitutional questions of the rebellion and the period of reconstruction are discussed, and there is an examination of the leading documents of this period.—*Two hours a week, throughout the year.*

## Constitutional Law and Political Institutions of the United States.

In this course there is a consideration of the Constitution as it has been interpreted by the courts, and a study of the political system as it appears in action. Graduate students electing this work are expected to read important texts, to examine leading cases, and to report on problems in politics and administration.—*Three times a week, for one semester.*

In addition to following the three courses just described, graduate students meet periodically to make reports on current literature, to discuss new books, and to examine important political questions or decisions of the courts.

### Assistant Professor Dow:—

#### Studies in the History of France in Mediæval and Early Modern Periods.

In the *first semester* this course deals chiefly with institutions in France during the feudal period. In the *second semester* special attention is given to changes which took place in the later mediæval and early modern periods.—*Three hours a week.*

### Dr. CROSS:—

#### English History.

An advanced course in English Constitutional History is given in each semester. The course in the *first semester* deals with the period preceding the reign of Edward I, and is based mainly on Stubbs's Select Charters. In the *second semester* the course deals with the constitutional aspects of the Puritan Revolution, and is based on Gardiner's Constitutional Documents.—*Two hours a week.*

### Assistant Professor FAIRLIE:—

#### Administrative and Municipal Law.

A course *three hours a week throughout the year* deals with the principles and machinery of central and local administration in England, France, Germany, and the United States, and the legal relations of administrative officials. A course *three hours a week throughout the year* deals with the functions and organization of municipalities and compares their development and present status in different countries. There is also given a research course for the study of municipal law problems, *two hours a week throughout the year.*

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### Philosophy.

The advanced courses described below and marked with an asterisk (\*) presuppose instruction in logic, ethics, and general psychology; also a general introduction to philosophy, and a somewhat extended study of the history of philosophy, ancient, mediæval, and modern. Candidates for a higher degree who have not had a preparation equivalent to this are expected to take certain of the lower courses, either before entering upon, or in connection with, their graduate work. Advanced courses bearing upon the history of philosophy are also given in the departments of Greek, Latin, French, and German. The courses in mathematics are strongly recommended for students specializing in philosophy.

#### A. HISTORY OF PHILOSOPHY.

Professor WENLEY:—

**\*The Philosophy of Kant.**

Proseminary; study of the Critique of Pure Reason.—*Two hours a week, first semester.*

**\*The Philosophy of Hegel.**

Study of the Logic and discussions.—*Two hours a week, second semester.*

Professor LLOYD:—

**The History of Philosophy.**

A general outline of the subject from Thales to the present century. The course is designed to state the development of philosophical problems and concepts, and thus to give the student his bearings in philosophy. It is therefore highly advisable, if this course has not been taken before beginning graduate work, that it be taken at once upon beginning it.—*Three hours a week, throughout the year.*

**\*Philosophy since Hegel.**

The object of this course is to introduce the student to the methods of investigation and discussion in the subject. Lectures; detailed study of Lotze, the Pessimists, etc.—*Two hours a week, second semester.*

**Philosophy of History.**

Lectures and study of special periods.—*Two hours a week, first semester.*

Assistant Professor REBEC:—

Philosophy in America.

Lectures, and reading of Edwards, the Transcendentalists, etc.—  
*Two hours a week, first semester.*

\*Plato's Republic.

Collateral reading and theses.—*Two hours a week, first semester.*

## B. ETHICS.

Professor WENLEY:—

The Development of Ethical Ideas.

A historical review of early morality—Palestine, Greece and Rome; the conditions into which Christian ethics entered.—*Two hours a week, first semester.*

Systematic Ethics.

Lectures on ethical theory. Application of psychology to a theory of conduct.—*Two hours a week, second semester.*

Professor LLOYD:—

Metaphysic of Ethics.

Lectures on the metaphysical implications of ethical theory.—*Two hours a week, second semester.*

Assistant Professor REBEC:—

\*Aristotle's Ethics.

Collateral reading and theses.—*Two hours a week, second semester.*

## C. PSYCHOLOGY.

The Psychological Laboratory is well equipped for original investigation.

Assistant Professor PILLSBURY and Mr. SLAUGHTER:—

Beginners' Course in Experimental Psychology.

*Three hours a week, each semester.*

Second Course in Experimental Psychology.

*Three hours a week, second semester.*

**\*Research Course in Experimental Psychology.***Six hours a week, throughout the year.***Genetic Psychology.***Two hours a week, first semester.***Systematic Psychology.***Two hours a week, second semester.***D. SPECIAL COURSES.****Professor WENLEY:—****\*Movements of Thought in the Nineteenth Century.**

A study of the metaphysical implications of modern thought. Lectures, reading, thesis.—*Two hours a week, second semester.*

**Philosophy of Religion.***Two hours a week, first semester.***Professor LLOYD:—****Metaphysics—a Criticism of some Current Scientific Ideas.**

Lectures, reading, reports.—*Two hours a week, first semester.*

**Political Philosophy.**

A critical study of society, of sovereignty, rights, duty, and of the idea of the social organism.—*Two hours a week, second semester.*

**Assistant Professor REBEC:—****Æsthetics.**

A historical review of leading theories and their connection with philosophical systems. Bosanquet's *History of Æsthetics* will serve as a basis of study.—*Two hours a week, first semester.*

**Special Æsthetics.**

Relation of philosophy to interpretation of poetry.—*Two hours a week, second semester.*

**E. GRADUATE SEMINARY.**

The Library of George S. Morris, late Professor of Philosophy in the University, has been given to the Philosophical Department. It contains about 1100 volumes, covering the entire field of philosophical inquiry.

They have been removed to the Morris Seminary Room and are reserved for the exclusive use of graduates and special students in Philosophy.

Professors WENLEY and LLOYD, Assistant Professors REBEC and PILLSBURY, and Mr. SLAUGHTER:—

### Graduate Seminary.

The assignment of subjects is as follows: Professor WENLEY, Metaphysics, Ethics, Philosophy of Religion, and Ancient Philosophy; Professor LLOYD, History of Philosophy, Metaphysics, and Ethics; Assistant Professor REBEC, Logic, Æsthetics, and Ancient Philosophy; Assistant Professor PILLSBURY, General and Experimental Psychology; Mr. SLAUGHTER, General and Experimental Psychology, and Epistemology.

NOTE.—Stated meetings of graduate students with the Philosophical Faculty, *first semester*; special lecture course for all graduate students, by Professor WENLEY, *second semester*.

### The Science and the Art of Teaching.

The objects sought in this department, as they are defined in the Calendar of the University for 1899–1900, page 80, are partly practical and partly scientific. The one end is gained in preparing teachers professionally for teaching, the other, in promoting the study of teaching as a division of human knowledge. In the Graduate School more stress is laid upon the scientific phase of the subject than in undergraduate work.

Qualifications for admission to graduate work may be dealt with under two heads.

1. General Education.—When teaching is studied as science, art, or history it becomes reflective; that is, it takes account of its own principles, methods, and development. Manifestly, a student cannot pursue pedagogical studies with profit unless he has an education broad enough to furnish him with a basis upon which to build. More than this, the fundamental ideas of teaching as a study are furnished by other studies. Pedagogy is a mixed science, having its presuppositions in other sciences. While a student who has taken any one of the purely literary degrees given by the University should be able to carry on this subject with advantage, the best work calls for an elementary acquaintance, at least, with physiology, psychology, logic, ethics, and æsthetics, for these are the sciences in which the presuppositions of pedagogy are found.

2. Special Preparation.—In this respect the department differs somewhat from most others. It cannot, under existing conditions, require

previous study of the science, art, or history of education, because teaching, in only rare instances, is a subject of undergraduate instruction. Some candidates for the Graduate School have had such training; others have not. It is desirable that all who intend to pursue the subject in the School should have given some attention to it. A practical acquaintance with teaching as a teacher, principal, or supervisor is helpful; and so is a general knowledge of education and teaching derived from observation and reading current literature or standard works. It is desirable also that graduate students shall not find it necessary to take the most elementary work given in the department.

In respect to courses a few words must suffice. The theoretical and historical courses, and the courses in school supervision and in the comparative study of school systems, all are suitable for graduate students. If the courses as ordinarily pursued are not found adequate, they are re-enforced by outside reading. No graduate courses, so-called, are offered. Students who have taken courses in normal schools, or even in colleges, bearing the same names as those laid down in Announcement and Calendar need have no fear of finding work they have already done merely duplicated. These courses are more extensive and thorough. For example, Compayré's History of Pedagogy is prescribed as a text-book, but is prescribed mainly to mark out, in a general way, a field that is cultivated much more broadly and deeply than it is cultivated by the author of the book.

### Professor HINSDALE:—

#### Theoretical and Critical.

The principles underlying the arts of teaching and school management expounded. Lectures and reading.—*Four hours a week, second semester.*

#### School Supervision.

Embracing general school management, the art of grading and arranging courses of study, classifying pupils, examinations and promotions, conduct of teachers' meetings and institutes, etc. Recitations and lectures.—*Three hours a week, first semester.*

#### History of Education; ancient and mediæval.

Recitations and lectures. Text-book: Compayré's History of Pedagogy. The subjects treated in the lectures given in this course are Oriental, Greek, and Roman education, and the rise and early development of Christian schools.—*Three hours a week, first semester.*

### History of Education: modern.

Recitations and lectures. Text-book: Compayré's History of Pedagogy. The topics dealt with in this course of lectures are the movements of modern educational thought and practice.—*Three hours a week, second semester.*

### The Comparative Study of Contemporary Educational Systems: domestic and foreign.

Besides a general survey of the institutional organization of education in the United States, similar surveys are made of several foreign countries, as Germany, Italy, France, and England. Lectures.—*Two hours a week, second semester.*

### History of Educational Thought.

This course deals with Greek and Roman Antiquity and the Middle Ages, and with the more prominent of the great movements of thought in modern times. Lectures with reading. The following books mark out in a general way the track of the course: Davidson's Aristotle and Ancient Educational Ideals; West's Alcuin and the Rise of Christian Schools; and Browning's Educational Theories.—*One hour a week, second semester.*

### Professor WHITNEY:—

#### Social Phases of Education.

This course embraces a consideration of the school as a social factor in its relation to the child at home, the church, and the state; also a discussion of the relation of education to vocation and to crime. Lectures and recitations. Dutton's Social Phases of Education.—*Two hours a week, first semester.*

#### Political Economy and Sociology.

The strictly undergraduate courses in political economy represent the work of at least one academic year. These courses cover "Elements of Political Economy" and "Problems in Political Economy." For description see the University Calendar for 1899-1900, pp. 82 to 84.

The courses enumerated below are, with two or three exceptions, open to undergraduate as well as graduate students, but special instruction will be afforded all graduate students in connection with these courses, this special instruction being devoted to a more careful analysis and a more extended discussion than is possible in the lectures. The courses designated as "Graduate Courses" are open only to graduate



- students, or to undergraduates making a specialty of political economy in their senior year.

Professor ADAMS:—

### History of the Development of Industrial Society.

This course embraces a history of English industrial society from the twelfth century to the present time, and is designed to show how modern industrial customs and rights came into existence. It should be preceded by a course in English History.—*Three hours a week, second semester.*

### [Social and Industrial Reform.

This course treats of those reforms forced upon society by the industrial development of the past century. The special problems studied are the following: Cooperation, Profit-Sharing, Communism, Socialism, Factory Legislation, Workingmen's Insurance, Trades-Unions, and Industrial Federation.—*Four hours a week, first semester.* Not given in 1900-1901.]

### Transportation Problems.

This course considers the social and industrial significance of modern transportation, traces the development of railway transportation in this country and in the more important European countries, discusses the administrative and legislative organization of railway systems, studies the history of railway problems in the United States, and pays special attention to the experiment of controlling railways through commissions.—*Two hours a week, second semester.*

### [Administration of Corporate and Public Industries.

This course undertakes an analysis of industrial organization primarily from the administrative point of view. It considers the history and social significance of rapid transit in cities, and of other quasi-public industries. It studies railway administration under public as well as private ownership, and makes a special investigation into the history, organization and administration of the Post-Office Department of this and other countries. Alternates with the preceding course. Not given in 1900-1901.—*Two hours a week, second semester.*]

### Seminary in Political Economy.

It is the purpose of instruction by the seminary method to familiarize the student with independent investigation. It is not possible to advertise the topics studied until after consultation with the students

who elect the course; but in lieu of this may be submitted a description of the work during the past academic year.

*First Semester.*—The subject chosen for investigation was Foreign Commercial Relations in Theory and in Practice. It involved a study of secondary authorities, of the mercantile system in its relation to commerce, the physiocratic and free-trade theory of commerce, the List theory of industrial evolution, the American system of protection, and, finally, the commercial and industrial development which underlies existing commercial regulations in the United States. To this was added a study from original sources of the commercial needs and possibilities of the United States.

*Second Semester.*—The general subject selected for investigation was Labor and Industry in their Relation to Law. The purpose of this semester's study was to discover the attitude of the Courts towards the acts of Legislatures designed for the amelioration or the protection of labor and for the control or curtailment of monopolies. It is probable that these topics will be repeated during the academic year 1900-1901.

Professor TAYLOR:—

### Principles of the Science of Finance.

Under this title will be presented a discussion of principles of public expenditure, public revenue, budgetary legislation, financial administration, public industries, and public debts.—*Two hours a week, second semester.*

### Financial Legislation and Administration.

This course is intended to supplement the more theoretical treatment characteristic of the preceding course with a comparative study of financial practice. A special feature will be the study of notable episodes in financial history, e. g., the Financial Administration of the American Civil War, of the Franco-German War, etc.—*Two hours a week, first semester.*

### Theory and History of Money.

The first half of the semester will be occupied with the somewhat detailed discussion of special topics such as the Value of Money, the Ideal Standard, etc. The second half will be given to Monetary History, particularly in the United States.—*Two hours a week, first semester.*

### Theory and History of Banking.

Like the preceding, this course is roughly divided into two parts devoted respectively to theory and history. Among the topics con-

sidered will be the Nature and Social Functions of Banking, the Natural Laws of Banking Phenomena, the Different Systems of Regulation, etc.—*Two hours a week, second semester.*

[Economic Theory down to John Stuart Mill.

Ingram's History of Political Economy forms the basis of this course; but much of the time will be given to the study of masterpieces. This and the following course will be given in alternate years. Omitted in 1900-1901.—*Two hours a week, second semester.*]

Economic Theory from John Stuart Mill down.

As with the former course the student will make use of Ingram, but the shorter period covered will permit a larger use of outside literature and a fuller study of special schools.—*Two hours a week, second semester.*

Assistant Professor COOLEY:—

The Theory and Practice of Statistics.

This course treats statistics as a method of social research, an instrument important not only to economists and statisticians but also to all who wish to qualify themselves to understand or criticise current social and political discussion. The class read Mayo-Smith's Statistics and Sociology and, in addition, each member is assigned an exercise intended to afford some practice in collating statistical material and presenting it in tabular and graphical form. Advanced students only are admitted.—*One hour a week, first semester.*

Principles of Sociology.

This course aims at a systematic and comprehensive study of the underlying principles of social science. The general plan followed is to begin with personal relations in their simplest and most direct form; proceeding thence to the more complex forms of association, to an analysis of the processes of social change and, finally, to a study of social tendency and the theory of progress. Historical references are freely used, but the main aim is a rational interpretation of existing society, and ample contemporary illustration is given of the principles advanced. While some attention is paid to the differing views of prominent writers, the course is, in the main, constructive rather than critical.—*Four hours a week, first semester.*

Problems in Sociology.

This course embraces a study of the laws of population, degeneracy, the liquor problem, poor-relief (public and private), vagrancy,

crime and penology, the divorce problem, and kindred questions, the assimilation of the foreign element in American population, the development of cities, the tenement question, slums, social settlements, and other sociological questions of present interest.

The class is supplied with a list of about twenty-five topics, accompanied by references, and each student is required to choose one of these topics and write an essay upon it.—*Four hours a week, second semester.*

### Historical Development of Sociological Thought; Study of Comte, Spencer, Ward, Giddings, and Others.

This course is intended to furnish an opportunity for comparative study and discussion of the writers who have contributed most to the growth of sociology. The class consists chiefly of graduate students and is conducted somewhat as a seminary.—*Two hours a week, first semester.*

### Psychological Sociology.

This course is similar in character to Course 69 and usually, though not necessarily, succeeds it. The views of Baldwin, Giddings, Tarde, Durkheim and others are carefully studied, but, as in other courses, it is endeavored to make this study constructive rather than merely critical.—*Two hours a week, second semester.*

### Special Work with Graduate Students.

Graduate students sufficiently advanced in their work to need special guidance,—especially those working for the doctor's degree,—will be met in small groups or singly as often as is found practicable and expedient.

### Courses Given by Special Lecturers.

#### Physical Basis of Industrial Development.

This course is designed to trace the influence of the physical peculiarities of a country, whether natural or artificial, upon industrial development. It will be conducted by the following persons who will lecture upon topics indicated:

1. Professor Israel C. Russell, M.S., C.E., Professor of Geology in the University of Michigan, who will deliver eighteen lectures upon the Physical Geography of North America, with special reference to industrial development.
2. Mr. Lyman E. Cooley, C.E., Chicago, who will deliver five lectures upon the Industrial Significance of Ship Canals.

3. Professor Robert T. Hill, of the United States Geological Survey, Washington, D. C., who will deliver six lectures upon the Commercial Significance of the West Indies for the United States.
4. Assistant Professor E. D. Jones, of the University of Wisconsin, who will deliver eighteen lectures upon the Industrial Resources of the United States.  
*Three hours a week, first semester.*

### Industrial Organization, Legal and Administrative.

This course is designed to trace those principles both commercial and legal which determine the form of modern industrial organization. It will be conducted by the following persons:

1. Dr. O. M. W. Sprague, of Harvard University, who will deliver eighteen lectures upon International Division of Labor.
2. Mr. Thomas L. Greene, of New York City, Auditor of the Manhattan Trust Co., who will deliver five lectures upon the Function of the Promoter and Financier as an Element in Industrial Organization.
3. A lecturer yet to be selected, who will deliver five lectures upon the Function of Trades-Unions as an Element in Industrial Organization.
4. Professor Floyd Mechem, of the Law Department of the University of Michigan, who will give nine lectures upon Partnerships and Joint Stock Associations.
5. Professor H. L. Wilgus, of the Law Department of the University of Michigan, who will give nine lectures upon Corporations.  
*Three hours a week, second semester.*

### International Law.

The courses in international law presuppose a general acquaintance with modern European history.

President ANGELL:—

#### Lectures on International Law.

*Two hours a week, first semester.*

#### History of Treaties.

*Two hours a week, second semester.*

### Mathematics.

The courses mentioned below presuppose the usual preparatory course in algebra and elementary geometry, plane, solid, and spherical, together with two years of collegiate study devoted to trigonometry, higher algebra, plane analytic geometry, and differential and integral calculus.

In addition to the courses announced below, advanced work in mathematical reading and research will be arranged, so far as possible, to suit the needs of individual students.

#### A. FOR UNDERGRADUATES AND GRADUATES.

Professor BEMAN:—

##### Solid Analytic Geometry.

Frost, with references to Salmon.—*Two hours a week, first semester.*

##### Differential Equations.

Johnson, with references to Forsyth, Boole, and Mansion.—*Three hours a week, first semester.*

##### 'Teachers' Seminary.

Critical study of certain text-books in algebra and geometry, together with the discussion of methods and aims in mathematical teaching, sketches of the history of mathematics, lists of books for teachers, etc.—*Two hours a week, throughout the year.*

Professor ZIWET:—

##### Advanced Mechanics.

This course forms a direct continuation of the course in elementary mechanics; it is mainly devoted to the dynamics of a rigid body.—*Three hours a week, second semester.*

Assistant Professor MARKLEY:—

##### Projective Geometry, and Modern Analytic Geometry.

*Three hours a week, throughout the year.*

Dr. GLOVER:—

##### Higher Algebra.

The more important topics to be considered in this course are: symmetric functions of the roots; resultants; solution of a system of  $n$  linear equations; theorems concerning integral functions of one and two variables; correspondence; linear transformation; invariants and covariants; symbolic forms.—*Three hours a week, throughout the year.*

## B. PRIMARILY FOR GRADUATES.

Professor BEMAN:—

Advanced Differential and Integral Calculus.

Jordan's Cours d'analyse.—*Two hours a week, throughout the year.*

Higher Plane Curves.

Salmon, with references to Clebsch.—*Two hours a week, second semester.*

Linear Differential Equations.

*Two hours a week, second semester.*

Professor ZIWET:—

Theory of the Potential.

*Two hours a week, first semester.*

Partial Differential Equations.

This course, which presupposes an elementary knowledge of ordinary differential equations and projective geometry, is devoted mainly to partial differential equations of the first order and their application in geometry and mathematical physics.—*Two hours a week, throughout the year.*

Calculus of Variations.

*Two hours a week, throughout the year.*

Assistant Professor MARKLEY:—

Theory of Functions.

The first part of this course is devoted to functions of real variables; the second part to functions of a complex variable. It aims to present the fundamental ideas of complex quantities, their geometrical representation and their calculus, and to furnish an introduction to the theories of functions of a complex variable as developed by Cauchy, Riemann, and Weierstrass.—*Three hours a week, throughout the year.*

Theory of Numbers.

*Two hours a week, throughout the year.*

Dr. GLOVER:—

**Theory of Substitutions.**

The first half of this course will be devoted to the development of the elementary notions of groups, and, in particular, to the properties of substitution groups. The second half will take up the application of the latter to the algebraic equation.—*Two hours a week, throughout the year.*

**Theory of Invariants.**

An introduction to the symbolic theory of invariants as developed by Aronhold, Clebsch, and Gordan.—*Two hours a week, throughout the year.*

**Physics.**

The courses here announced presuppose about one and a half years' collegiate work in physics; viz., a course in mechanics, sound, light, electricity, magnetism, and heat, five hours a week, for one year; a beginners' course in laboratory work, two or three hours a week for half a year; and a course in primary and secondary batteries, two hours a week for half a year.

The courses in Mathematical Electricity, the Theory of Light, and the Theory of Heat, and the Advanced Laboratory Courses in Sound and Light, are primarily for graduates; the other courses are open to undergraduates, but they are found to be beyond the work done in many colleges.

Graduate students, who are properly qualified by their previous training, have opportunity for original research in the physical laboratory under the immediate supervision of the director and his associates.

Assistant Professor GUTHE has leave of absence for 1900–1901.

Professor CARHART:—

**Dynamo-Electric Machinery.**

*Three hours a week, second semester.*

**Alternate Current Apparatus.**

*Three hours a week, first semester.*

**Alternate Current Phenomena: Steinmetz.**

*Two hours a week, second semester.*

The three courses above named form a graded series covering the theory of dynamo-electric machines, alternate current working, trans-



formers, and alternate current phenomena as applied to generators, distribution of power, and induction motors. Laboratory work forms a part of the first two courses.

### The Theory of Heat: Preston.

This course covers most of the text, including the chapters on thermodynamics.—*Two hours a week, first semester.*

### Professor PATTERSON:—

#### Mathematical Electricity.

This course is a treatment of the subject with the use of higher mathematics. Special attention is given to the Newtonian potential function, polarized distributions, electrostatics, electrokinetics, electromagnetism, and electromagnetic waves.—*Three hours a week, first semester; two hours a week, second semester.*

#### Laboratory Work in Heat.

This course comprises determinations of specific heat of solids and liquids; heat of fusion and of vaporization; the coefficient of expansion of solids, liquids, and gases; also experiments on the constants of gases and vapors, such as the specific heat of gases, vapor density, vapor pressure, etc.; also the determination of the mechanical equivalent of heat by electrical methods.—*Twice a week, first semester.*

#### Electrical Measurements.

This course comprises, in addition to all the refined methods of measuring resistance, current, and electromotive force, a very thorough treatment of the subjects of capacity, inductance, and magnetism.—*Lectures, one hour a week, throughout the year; laboratory work, two or three times a week, first semester; twice a week, second semester.*

### Professor REED:—

#### The Theory of Sound.

Lectures and laboratory work. The lectures are based upon the works of Helmholtz and Rayleigh. The laboratory work involves acoustical and optical measurements of period, amplitude, and phase-difference of simple and compound vibrating systems; also the study of sensitive flames, organ pipes, resonators, and the application of stroboscopic methods to oscillating systems.—*Lectures, twice a week; laboratory work, twice a week, first semester.*

### The Theory of Light: Preston.

The work involves a careful study of the text, with supplementary reading. The laboratory work includes measurements with the focometer, spectrometer, polarimeter, and interferometer; determination of wave-lengths by diffraction and interference methods; and a study of arc and solar spectra.—Lectures and recitations, *two hours a week*; laboratory work, *twice a week, second semester*.

### Advanced Laboratory Work in Sound.

The work is devoted to a repetition of the classical experiments of Mach, Boltzmann, and Helmholtz; to the study of special problems; and to the application of optical methods to acoustical measurements.—*Twice a week, first semester*.

### Assistant Professor GUTHE:—

#### [Theories of Solutions and of Electrolytes.

The work includes the osmotic theory of the voltaic cell, electrolytic resistance, and the internal resistance of primary batteries.—*Three times a week, second semester*. This course will be omitted in 1900–1901.]

#### General Chemistry.

To be received as a candidate for a higher degree with chemistry as a major subject, the preparation must include the branches of general, analytical, and organic chemistry. The extent of work in these branches must have been equivalent in substance to the following named undergraduate courses in this University (University Calendar for 1899–1900, pages 88 to 94): Course 2 or 5 in general chemistry, and Courses 1, (equivalent to Course 3 in general chemistry together with Course 3a in analytical chemistry), 4, and 10 in analytical and organic chemistry,—making in all about twenty-seven hours of undergraduate credit.\* If chemistry be taken as a minor subject in work registered for a higher degree, preparation must have been made equivalent at least to undergraduate Courses 2 and 5 in general chemistry.

Candidates for a doctor's degree, in addition to the requirements above specified, must have satisfied the committee in charge of their studies as to their fitness to enter upon the higher work. A reading knowledge of German and French is necessary.

Graduate students who are not in work for a degree, and those who are preparing for registration as candidates for higher degrees according

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\*An "hour of credit" implies the satisfactory completion of work equivalent to ~~one~~ exercise a week during one semester.

to the requirements above stated, will be directed in such chemical studies as they require.

A very complete chemical library, with a full set of journals in demand for research, and with current literature in all branches of chemistry, is provided in the University General Library. A reading room in the Chemical Laboratory furnishes duplicates of the full sets most used, as well as duplicates of the chief compilations.

Professor FREER:—

### Historical Chemistry.

Lectures and historical reading, covering the history of the science from the beginning to 1860.—*Two hours a week, first semester.*

### Chemical Literature; Journal Club.

The Journal Club discusses current chemical literature. It is under the direction of Professor FREER, but the professors, instructors and assistants in the laboratory take part therein. All of the prominent journals are divided among the participants, who report on the most interesting topics in rotation.—*One hour to one and one-half hours a week, throughout the year.*

### Laboratory Research.

The work may be either organic or inorganic, and the student is at liberty to select one from a number of topics proposed. The work includes the study of the literature bearing upon the topics. In order to accomplish results the student should have at least five clear half days a week to devote to the work. This statement applies to all research courses.—*Hours arranged with instructor, throughout the year.*

Dr. BIGELOW:—

### Physical and Theoretical Chemistry.

This course is intended to cover, in an elementary manner, all of the chief topics of modern theoretical and physical chemistry. It is preliminary to, or it should accompany, laboratory work. Lectures.—*Three hours a week, either semester.*

### Physical and Theoretical Chemistry.

Advanced course.—*Two hours a week, second semester.*

### Laboratory Work in Physical Chemistry.

This course covers, as much as possible, the ground outlined in the lectures. It includes the standard methods of determining

molecular weights, the theories of solution, dissociation, etc. It is essential for all who wish to become acquainted with modern chemistry.—*Hours arranged with instructor.*

#### Laboratory Research.

Physical Chemistry.—*Hours arranged with instructor.*

Dr. HULETT:—

#### Laboratory Work in Selected Topics of Inorganic Chemistry, including Inorganic Preparations.

This work is preparatory to research, and also includes a training in preparing demonstrations proper for use in teaching.—*Hours arranged with instructor, throughout the year.*

#### Laboratory Research.

*Hours arranged with instructor, throughout the year.*

Mr. LICHTY:—

#### Laboratory Work with the Polariscope and the Spectroscope.

This course includes the theory of the instruments, their practical applications, and the study of stereochemical questions involved.—*Hours arranged with instructor, second semester.*

Dr. DUNLAP:—

#### Laboratory Work in Selected Topics of Chemistry.

*Hours arranged with instructor, throughout the year.*

#### Laboratory Research.

Organic or Inorganic Chemistry.—*Hours arranged with instructor.*

#### Analytical Chemistry and Organic Chemistry.

Professors PRESCOTT and CAMPBELL, Assistant Professor GOMBERG, Mr. TROWBRIDGE, and Mr. WHITE:—

#### Seminary in Recent Research.

Library work upon chosen questions in pure and applied chemistry, discussions in the seminary, and the writing of reviews. A subject is assigned to each student, who reads in the journals by direction, and reports the literature for discussion, preparatory to the writing of his review. A record of all the work of the seminary is made by each member for himself.—*Two hours a week, throughout the year.*

Professor JOHNSON:—

Qualitative Analytical Chemistry.

Following undergraduate Course 1 (University Calendar for 1899–1900, page 91) or its equivalent. Laboratory work and lectures.—Lectures *twice a week, second semester*; laboratory work, including electrical methods, *hours arranged with instructor*.

Professor JOHNSON or Dr. SULLIVAN:—

Investigation of Inorganic Reactions.

Laboratory and library research. Opportunity is given for application of the methods of physical chemistry to analytical investigation. Apparatus for measurement of electrical conductivity and potential differences of solutions, thermostats for determination of solubility, and the usual other facilities for work of this nature are provided.—*Hours arranged with instructor, throughout the year*.

Professor CAMPBELL:—

Quantitative Analytical Chemistry.

To follow undergraduate Course 4 (University Calendar for 1899–1900, page 91) or its equivalent. Laboratory work directed by lectures in any of three courses, namely: (1) Advanced quantitative methods in general, (2) the analysis of minerals, (3) iron and steel analysis, (4) cement materials. Electrolytic methods are much employed and there is a room devoted to their use.—*Hours arranged with instructor, throughout the year*.

Investigation in Analytical Method, Inorganic Structure, and Metallurgical Chemistry.

Laboratory work upon questions related to researches published from this department. Use is made of Le Chatelier's pyrometer, as well as of calorimetric methods in study of heats of formation. Special work is given in micrometallography, as bearing upon the constitution of metals and their alloys.—*Hours arranged with instructor, throughout the year*.

Professor CAMPBELL and Mr. WHITE:—

Technical Methods and Investigations.

Laboratory work as follows: (1) Technical Gas Analysis, (2) Technical Examination of Gold and Silver Ores, (3) The Cement Industry, (4) The investigation of some chosen other subject in chem-

ical industry, whether inorganic or organic.—*Hours arranged with instructors, throughout the year. In (2) the work must begin in first semester.*

Mr. WHITE:—

### Chemical Technology.

Lectures on the main chemical industries, inorganic *in the first semester*, and organic *in the second semester*. Among the subjects treated are the alkali and acid industries, cements, wood and coal distillations, beet sugar, starch, glucose, paper, bleaching, dyeing, and tanning.—*Five hours a week, throughout the year.*

Mr. TROWBRIDGE:—

### The Chemistry of Beet Sugar.

Laboratory work with lectures. The methods of analysis in sugar laboratories, the processes of beet sugar factories, and the several related chemical interests.—*Hours arranged with instructor, throughout the year, to begin in the first semester.*

### Analytical Organic Chemistry.

A laboratory course with lectures upon alkaloids; a laboratory course with lectures upon fats; laboratory work upon food analysis; the analyses for poisons; the chemical analysis of plants; the chemical constitution of new alkaloids; the assay of drugs; special subjects.—*Hours arranged with instructor, throughout the year; the lectures in the second semester.*

Assistant Professor SCHLOTTERBECK:—

### The Chemistry of Plants.

The chemical constitution of the principles of plants of related species grown in the botanical gardens.—*Laboratory work, throughout the year.*

Assistant Professor GOMBERG:—

### Lectures on Chosen Subjects.

In 1899-1900 the subject chosen was stereochemistry.—*Two hours a week, first semester.*

### Lectures on the Benzene Derivatives.

Following undergraduate Course 10 (University Calendar for 1899-1900, p. 91) or its equivalent.—*Four hours a week, second semester.*

### Organic Synthesis and Ultimate Analysis.

Laboratory work.—*Hours arranged with instructor, throughout the year.*

### Investigation in Organic Chemistry.

Laboratory work upon subjects related to Dr. Gomberg's published researches.—*Hours arranged with instructor, throughout the year.*

#### Professor PRESCOTT:—

##### Lectures on Organic Chemistry.

A beginning course with library studies.—*Five times a week, in either first or second semester.*

##### Investigation in Organic or in Analytical Chemistry.

Laboratory and library research upon subjects selected.

##### **Bacteriology, Hygiene, Physiological Chemistry.**

The courses here announced presuppose that the student taking them is prepared for original research.

#### Professor VAUGHAN:—

##### Original Research on the Causation of Disease.

*Hours arranged with instructor, either first or second semester.*

#### Professor NOVY:—

##### Special Methods in Bacteriology.

A course in advanced laboratory work in bacteriology. It deals with the preparation and use of Pasteur pipettes, the drawing of blood, the collection and sterilization of serum, the filtration of bacterial liquids, the preparation of tuberculin, tetanus, and diphtheria toxins, the preparation of antitoxic and anti-infectious sera, serum agglutination, the determination of the thermal death-point, of the action of antiseptics and disinfectants, the detection of bacteria in sections, the collodium sac method, inoculation for rabies, etc. The student, when qualified, is assigned special problems for investigation and research.

The course must be preceded by Courses 2 and 3, described in the University Calendar for 1899-1900, page 94.—*Hours arranged with instructor, either first or second semester.*

### Advanced Physiological Chemistry.

Laboratory work and reading.—*Hours arranged with instructor, either first or second semester.*

### Methods of Hygiene.

Chemical and bacteriological examination of water, air, soil, milk, butter, etc.—*Hours arranged with instructor, either first or second semester.*

### Astronomy.

A knowledge of general astronomy and calculus is required for all courses. In the theoretical courses a careful training is given in those principles of exact astronomy which should be prerequisites for all investigations.

Professor HALL:—

#### Spherical Astronomy.

Transformation of coordinates, precession, nutation, aberration, determination of fundamental constants, and theory of instruments.—*Three hours a week, throughout the year.*

#### Theory of Least Squares.

*Two hours a week, first semester.*

#### Theory and Computation of Orbits.

*Five hours a week, first semester.*

#### Mathematical Theory of Planetary Motion.

*Three hours a week, second semester.*

#### Extended Practical Course.

*Hours arranged with instructor, throughout the year.*

NOTE.—The Observatory is provided with a  $12\frac{3}{4}$ -inch equatorial by Fitz, a  $6\frac{1}{3}$ -inch Pistor and Martins meridian circle, 6-inch Fauth equatorial, 3-inch meridian transit with zenith telescope attachments, surveyor's transit, sextant, chronograph, and chronometers.

### Mineralogy.

The higher work in mineralogy presupposes an elementary knowledge of chemistry and an introductory course in mineralogy, combining theoretical instruction with practice in determining minerals. The work is directed by Professor PETTEE.



### Geology.

The course of instruction in geology for undergraduates, as announced in the University Calendar for 1899-1900, pages 97 and 98, embraces from two to three years University work. The first year is devoted to elementary studies in physical geology, historical geology, and physical geography, giving three hours a week to each for one semester. Le Conte's Elements of Geology and Dana's Manual of Geology are used, supplemented by lectures and exhibitions of specimens, maps, etc. During the second year more detailed instruction is given, two hours each week, in the same general subjects. Green's Physical Geology is used for reference during the first semester, supplemented by lectures and laboratory work. Each student is given a special subject for investigation in connection with which a thesis of about 2500 words is required. During the second semester palæontological studies are carried on with the aid of various treatises and laboratory work. A special subject is assigned each student and a short thesis is required.

Students in the graduate school may enter either of the advanced courses mentioned above, provided studies equivalent to the elementary courses have been pursued. Those who have done more work than is represented by the elementary course may make special arrangements for instruction and assistance in various lines of study dependent on their tastes and acquirements. In a general course the current literature of geology will be read with special reference to Pleistocene geology, and to the origin and classification of topographic forms, glacial records, lake histories, erosion, and all of the processes by which the surface of the earth has come to have its present form.

The geological museum is being arranged and a series of fossils selected to illustrate the life history of North America. This collection is intended especially for the use of students in the elementary courses, but may be consulted by advanced students as well. The specimens will be exhibited in the lecture room as required, and after lectures will be returned to the cases in the museum where they will be available for examination at any time.

There is a second collection embracing some ten thousand specimens of both American and European fossils, which is arranged zoologically and intended for the use of advanced students in palæontology. Special collections of rocks, brachiopods, corals, etc., numbering from one hundred and fifty to two hundred specimens each are arranged in the geological laboratory for the immediate use of students.

The collection in physical geology is small, but efforts are being made for its enlargement, and ample material will be on hand to illustrate lectures in this department. Students bringing private collections will

be given an opportunity to arrange them in cases provided for the purpose, and facilities for consulting original monographs and making comparison with specimens in the museum.

The geological laboratory is provided with apparatus for preparing thin sections of fossils and rocks, and with microscopes and photographic instruments. The laboratory is open to students from nine until five each day throughout the collegiate year.

The work in geology is conducted by, or under the direction of Professor RUSSELL.

### **Botany.**

The work in botany in this University is divisible into morphology, physiology, and classification. For the study of each of these divisions there are specially equipped rooms with a large amount of general and special apparatus. New apparatus is purchased or constructed as it may be needed in investigation. In the laboratory is shelved a working library, including the leading domestic and foreign journals and ample facilities for tracing the literature of any subject.

The herbarium contains 80,000 specimens, being especially rich in algae and economic fungi. A plant garden on the campus, adjacent plant houses, and woods, fields, swamps, and waters in the vicinity furnish material for study and opportunity for experiment.

To be admitted to graduate work, a student must have pursued the collegiate study of botany for at least a year. A minor in botany for the master's degree will not include research; but a major in botany for the master's degree may include research, or may be taken wholly in courses, according to preparation and needs of the candidate. In any case the candidate receives special supervision and direction from the instructor. For the doctorate, a minor in botany will be approximately equivalent to a major for the master's degree. The requirements for a major are to be found on page 8 of this Announcement.

#### **A. FOR GRADUATES AND UNDERGRADUATES.**

The equivalent of a full year in the collegiate study of botany is required for admission to any of the courses named below, nearly all of which consist largely of laboratory work.

**Professor SPALDING:—**

#### **Ecology.**

A study of the habits and adaptations of plants. The floras of glacial lakes, sphagnum swamps, and the Huron river in the vicinity of Ann Arbor afford part of the material and topics for this course. Lectures and demonstrations, *one hour a week*, or with laboratory work, *two or more hours a week, first semester.*

## Distribution and Relationship.

Lectures and demonstrations, *one hour a week*, or with laboratory work, *two or more hours a week*, *second semester*.

Professor NEWCOMBE:—

## General Morphology and Physiology.

Cell structure, tissue structure, and organography; the cell theory, mitosis, heredity; practice in technique. Lectures and laboratory work.—*Five hours a week*, *first semester*.

## Experimental Physiology of Plants.

A laboratory and outdoor study of the relation of plants to their environment, as manifested by the phenomena of nutrition, growth, and irritability. This work is divided into two courses; the more elementary course is given the *second semester*, and may be followed in the *first semester* of the next year by the more advanced course which is preparatory to research. Lectures and laboratory work.—*Five or more hours a week*, *throughout the year*.

Dr. POLLOCK:—

## Reproduction and Embryology of Flowering Plants.

A study of the development of pollen and the embryo sac; fertilization; alternation of generations; embryology. Lectures and laboratory work.—*Three hours a week*, *second semester*.

Dr. SNOW:—

## Experimental Morphology.

A study of the influence of environment and the factors in the development of the forms of plants. The material used for experiment is supplied mostly from various species of algae. Lectures and laboratory work.—*Three or more hours a week*, *throughout the year*.

THE BOTANICAL FACULTY:—

## Current Literature of Botany.

Meetings of instructors and advanced students are held once a fortnight throughout the year at which reports of original work and reviews of important contributions to botanical literature are made.

## B. PRIMARILY FOR GRADUATES.

Professor SPALDING:—

## Ecological Investigations.

Problems as to the origin of specific characters; variation; parasitism and symbiosis; and the origin of local plant societies.—*Five or more hours, each semester.*

## Investigations in the Morphology and Physiology of Fungi.

Fungous diseases, general morphology, relationship, distribution, ecology.

Professor NEWCOMBE:—

## Investigations in Physiology and Cytology.

Problems in plant nutrition, growth, irritability, reproduction, cell division, and cell physiology.

The Botanical Faculty:—

## Field Club.

Excursions under the direction of different members of the staff of instructors are made for the purpose of becoming familiar with the local flora and studying the habits of its plant societies. *Second semester.*

## Zoology.

The courses here announced presuppose a year's work in general biology, such as is carried on in this University conjointly by the departments of botany and zoology.

Graduate students will often find the elementary work in general biology of value to them, and they can rarely omit, without loss, any of the courses in zoology that are open to undergraduates.

A description of the laboratory is given in the University Calendar for 1899-1900, page 33. A library shelved in the laboratory contains sets of the important English and foreign periodicals, as well as many monographs, and other separate publications. It contains also an extensive collection of books and articles relating to the invertebrate fauna of fresh waters. The library of the Department of Medicine and Surgery, which is rich in the literature of vertebrates, is also accessible to students. The original papers in connection with both lectures and laboratory work are placed in the hands of students, and special reading is required.

A student who selects zoology as a *minor for the master's degree* will usually pursue but one of the lines of work indicated below, and will not

undertake research work. If zoology be chosen as a major, the work will ordinarily include research.

For the doctorate a minor in zoology will involve about as much work as a major for the master's degree, but will usually not include research.

Those electing zoology as a *major* for the *doctor's degree* are expected to complete all the courses offered. During the first part of his term of residence at the University, the candidate should devote his time to these courses and to the completion of work on the minors. In his second year of residence, in addition to completing the work mentioned, he is expected to repeat a designated piece of research work in order to acquaint himself with methods of investigation. At the same time he does assigned reading on the more important problems of zoology and on zoological history and theory. At the least one year must be devoted to the research which is to be embodied in the doctor's dissertation.

Those electing zoology as a major, will find it of advantage to select, as a *minor study*, some one of the following subjects: Anatomy, histology, botany, physiology, palæontology, physiological psychology. Less closely related is work in bacteriology, physiological chemistry, physical chemistry, organic chemistry, and geology.

#### A. FOR GRADUATES AND UNDERGRADUATES.

Professor REICHARD:—

Vertebrate Zoology: the Classification, Comparative Embryology, and Anatomy of Vertebrates.

The work in embryology, which precedes the anatomy, begins with a study of the early stages of fishes and amphibia and concludes with detailed work on the chick. In anatomy a few type forms are dissected and preparations of other forms are studied. The lectures are illustrated by charts and preparations especially designed for the purpose of this course.—*Six hours a week, throughout the year.*

This work may be advantageously preceded by the course in mammalian anatomy and the courses in histology (Courses 7 and 8, University Calendar for 1899-1900, pages 104 and 105), though these courses are not required.

Dr. JENNINGS:—

Experimental Zoology.

Lectures reviewing recent experimental work on the effects of external agents on the development and other activities of organisms, as bearing on the structure of protoplasm and the essential nature of vital processes.—*One hour a week, second semester.*

### Mammalian Anatomy.

Dissection of the cat, with class-meetings twice a week for quizzes on the anatomy of the cat and for such lectures as may be necessary. It is the purpose of the course to afford a training in mammalian anatomy which shall be substantially equivalent to the training which the medical student receives in human anatomy. This training gives that mastery of anatomical facts and that knowledge of anatomical technique, which are believed to furnish the most satisfactory basis for the study of human or comparative anatomy or of mammalian physiology. The class will use REIGHARD and JENNINGS'S Anatomy of the Cat (Henry Holt & Co.).—*Six times a week, second semester.*

Dr. HOLMES:—

### Invertebrate Zoology.

The structure, classification, habits, and distribution of invertebrate animals with special reference to the influence of environment, to adaptation, and to the general principles of organic evolution.—*Five times a week, first semester.*

Teacher's Course: High School Zoology, and methods of teaching it.

This course attempts to acquaint students with the forms most suitable for use in a high-school course and with the methods of obtaining these forms and of utilizing them for class purposes. Each student will make a special study of one or more types and will prepare outlines for its high school use.—*Two hours.*

### Cytology.

Lectures on the structure and activities of the cell and its relation to development and inheritance; with laboratory work. Lectures twice a week, at hours to be arranged. Laboratory work one-half day.—*Three times a week, second semester.*

Dr. GENTHE:—

### The Animal Parasites of Man and the Lower Animals.

With special reference to the general principles and their relations to man. Of special interest to medical students. Lectures twice a week at hours to be arranged. Laboratory work one half day.—*Three times a week, first semester.*

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B. PRIMARILY FOR GRADUATES.

Profesor REIGHARD:—

Investigations in

- a) Animal morphology, especially the embryology of the lower vertebrates.
- b) The habits of fishes.

Dr. JENNINGS:—

Investigations in experimental zoology: the reactions of animals to stimuli.

Dr. HOLMES:—

Investigations in

- a) Cytology.
- b) Systematic Zoology: the classification, distribution and variation of animals.

The ZOOLOGICAL FACULTY:—

The instructors and advanced students hold weekly meetings at which reports are made on important current papers, followed by informal discussion. Although the meetings are open to all, the membership is restricted.—*One hour a week, throughout the year.*

FIELD CLUB.

This is a voluntary organization of zoological students for the purpose of studying the local fauna. Field excursions are made at regular intervals, and occasional meetings are held for lectures and for other purposes. Members of the zoological staff are members of the club and take part in its work.—*Throughout the year.*

**Physiology.**

The advanced work in physiology presupposes a knowledge of anatomy, including histology, and the elements of physics and chemistry. The required training is to be got from courses described in the University Calendar for 1899–1900, pages 87 to 106, such as 1 and 2 in general biology, 5 in zoology, 8 and 9 in anatomy, 1, 2, and 3a in physics, 5 in general chemistry, and 28 in organic chemistry. Ability to read German is indispensable, and French is desirable, for students taking physiology as a major study for an advanced degree, though in some cases a candidate may be considered qualified to begin his advanced work prior to the completion of these requirements.

Professor LOMBARD:—

Lectures and Recitations.

*Five hours a week, first semester; three hours a week, second semester.*

**Laboratory Course.**

*Four afternoons a week, one-third of a semester.*

**Advanced Course in Physiological Experimentation.**

*One afternoon a week, one semester.*

**Physiological Research and Collateral Reading.**

Arranged to meet the needs of students who take physiology as a major study.

**Anatomy.**

Before entering upon graduate work in the department of Anatomy, a student must have completed courses in the following subjects (for a more detailed statement of which the University Calendar may be consulted) or an equivalent amount of work along similar lines: Anatomy Courses 1 (Osteology), 2 and 3 (General Anatomy), 5 and 6 (Practical Anatomy), 7 or 8 (Vertebrate Histology), Zoology, Course 9 (Vertebrate Embryology) or the course in Embryology given by Dr. Huber in the Medical Department.

**Professor McMURRICH:—****The Anatomy of the Central Nervous System.**

*Two hours a week, first semester.*

**Professor McMURRICH and Professor HUBER.****Advanced Work in the Anatomy of the Central Nervous System.**

This course is a continuation of the preceding, and consists principally of laboratory work and special reading.—*Hours to be arranged with instructors.*

**Structure of the Sense Organs.**

This course is principally a laboratory course. The various special sense organs will be studied with the aid of the modern histological methods, and a certain amount of special reading will be required.—*Hours to be arranged with instructors.*

**Anatomical and Embryological Research.**

Students electing this course will be assigned special topics for investigation under the supervision of the instructors.—*Hours to be arranged with instructors.*

**Professor HUBER:—****Research Work in Histology.**

*Hours to be arranged with instructor.*



## *Catalogue of Students, 1899-1900.\**

### RESIDENT GRADUATES.

| NAME.                                                                                          | RESIDENCE.              |
|------------------------------------------------------------------------------------------------|-------------------------|
| George Henry Allen, A.B., 1898, A.M., 1899,<br>Latin; Greek; History.                          | <i>Grand Rapids.</i>    |
| Sadie Maria Alley, Ph.B., 1895,<br>Latin; Roman Political Antiquities; Mathematics.            | <i>Detroit.</i>         |
| Joseph Ellet Antram, A.B., <i>Mount Union Col-<br/>lege</i> , 1897,<br>Latin; Greek; Pedagogy. | <i>Alliance, O.</i>     |
| Benjamin Franklin Bailey, B.S. (E.E.), 1898,<br>Physics; General Chemistry; Mathematics.       | <i>Detroit.</i>         |
| Edna Lenore Ballard, A.B., 1898,<br>Latin; Greek; Philosophy.                                  | <i>Ann Arbor.</i>       |
| Bertha Emily Barber, A.B., 1897,                                                               | <i>Norwalk, O.</i>      |
| †Louisa Elizabeth Barker, A.B., 1900,<br>Latin; English Literature; Botany.                    | <i>Davenport, Ia.</i>   |
| Elmer Sereno Bassett, B.S., 1897,<br>Astronomy; Mathematics; Physics.                          | <i>Saline.</i>          |
| John Watson Beach, A.B., 1896,<br>Latin; Greek; English Philology.                             | <i>Lexington.</i>       |
| Helen Louise Bishop, A.B., <i>Vassar College</i> , 1897,<br>Latin; Greek; Pedagogy.            | <i>Detroit.</i>         |
| Clara Louisa Botsford, B.L., 1898,                                                             | <i>Plainwell.</i>       |
| Kendall Page Brooks, A.B., <i>Alma College</i> , 1897,<br>Mathematics; Physics; Pedagogy.      | <i>Alma.</i>            |
| Alice Gertrude Burdsal, B.L., 1899,                                                            | <i>Ravenswood, Ill.</i> |

\* The principal subjects of study pursued by candidates for an advanced degree are indicated under their respective names.

An asterisk (\*) before a student's name indicates that the student is also pursuing studies in the Department of Law.

A dagger (†) indicates that the student was admitted to the Graduate School at the beginning of the second semester, on completion of the requirements for the bachelor's degree indicated in each case, though the degree was not to be conferred until the end of the year.

The letter s denotes that the student was also enrolled in the summer school of 1899.

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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Edmund Claude Champion, B.S., 1899,<br>Analytical Chemistry; Chemical Technology; Geology.                                                                                                                | <i>Three Rivers.</i>   |
| sAllen Lysander Colton, Ph.B., 1889, A.B.,<br>1890, A.M., 1898,                                                                                                                                           | <i>Ann Arbor.</i>      |
| Ruie Ann Connor, Ph.B., 1899,<br>Latin; Philosophy; Hygiene.                                                                                                                                              | <i>Ann Arbor.</i>      |
| Alfred LaRue Davenport, B.S., <i>Pomona College</i> ,<br>1897,<br>Physics; Chemistry; Mathematics.                                                                                                        | <i>Pomona, Cal.</i>    |
| Rachel Ella Dawson, Ph.B., 1888,<br>English Literature; Philosophy; English Philology.                                                                                                                    | <i>Pontiac.</i>        |
| John William Tell Duvel, B.S., <i>Ohio State Uni-</i><br><i>versity</i> , 1897, <i>Holder of the Dexter M.</i><br><i>Ferry Botanical Fellowship</i> ,<br>Botany; Vegetable Physiology; Organic Chemistry. | <i>Wapakoneta, O.</i>  |
| Wallace Stedman Elden, A.B., <i>Bowdoin College</i> ,<br>1889, A.M., <i>ibid.</i> , 1892,<br>Latin; French Philology; French Literature.                                                                  | <i>Waterville, Me.</i> |
| Oren Samuel Flanagan, A.B., <i>Kalamazoo College</i> ,<br>1892,                                                                                                                                           | <i>Ann Arbor.</i>      |
| Clarence James Foreman, B.S., <i>Michigan Agri-</i><br><i>cultural College</i> , 1894, M.S., <i>ibid.</i> , 1896,<br>History; Political Economy; Pedagogy.                                                | <i>Harbor Springs.</i> |
| †Elmer Leslie Freeman, A.B., 1900,<br>American History; Latin; Greek.                                                                                                                                     | <i>Detroit.</i>        |
| James Leslie French, A.B., 1899,<br>Hebrew; Philosophy of Religion; Modern Ethics.                                                                                                                        | <i>Grand Rapids.</i>   |
| Maude Ethel Fuller, A.B., 1895,<br>Latin; Greek; English Literature.                                                                                                                                      | <i>Charlotte.</i>      |
| Anna Bordwell Gelston, Ph.B., 1881,<br>English Literature; Italian Literature; Rhetoric.                                                                                                                  | <i>Ann Arbor.</i>      |
| Marguerite Gibson, B.L., 1900,<br>French; English Literature; Rhetoric.                                                                                                                                   | <i>Chicago, Ill.</i>   |
| Frances Katherine Gould, B.L., 1892,<br>English Literature; History; Rhetoric.                                                                                                                            | <i>Flint.</i>          |
| Augustus Ernest Guenther, B.S., 1898,<br>Physiology; Physiological Chemistry; Histology.                                                                                                                  | <i>Sandusky, O.</i>    |
| George Depue Hadzsits, A.B., 1895, A.M., 1896,<br>Greek; Latin; Philosophy.                                                                                                                               | <i>Detroit.</i>        |
| Walter David Hadzsits, A.B., 1898, A.M., 1899,<br><i>Holder of the Elisha Jones Classical Fel-</i><br><i>lowship</i> ,<br>Latin; Greek; Philosophy.                                                       | <i>Detroit.</i>        |

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|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Arthur Graham Hall, B.S., 1887,<br>Mathematics; Physics; Mechanics.                                                                                       | <i>Ann Arbor.</i>        |
| Florence Mooers Hall, B.L., 1900,<br>English Literature; American History; Rhetoric.                                                                      | <i>Chicago, Ill.</i>     |
| Enoch Horton Harriman, B.L., 1892,<br>Physics; Mathematics; Chemistry.                                                                                    | <i>Fenwick.</i>          |
| William Henry Hawkes, A.B., 1887,<br>Physics; Mathematics; Chemistry.                                                                                     | <i>Ann Arbor.</i>        |
| Henry Heitmann, Ph.B., 1899,<br>History of Philosophy; Philosophy of Hegel; German.                                                                       | <i>New Bremen, O.</i>    |
| Alice Jovita Hickey, B.L., 1899,<br>German; French; English.                                                                                              | <i>Michiganme.</i>       |
| George Oswin Higley, B.S., 1891, M.S., 1893,<br>Inorganic Chemistry; Physics; Mineralogy.                                                                 | <i>Ann Arbor.</i>        |
| Alice Sarah Hussey, A.B., <i>Vassar College</i> , 1894,<br>A.M., 1899,<br>Rhetoric; Aesthetics; English Literature.                                       | <i>Rochester, N. Y.</i>  |
| Samuel Allen Jeffers, A.B., <i>Central Wesleyan<br/>College</i> , 1892, A.M., 1897,<br>Latin; Greek; Ancient Ethics.                                      | <i>New Florence, Mo.</i> |
| Alice Clarissa Joy, Ph.B., <i>Albion College</i> , 1898,<br>American History; European History; Political Economy.                                        | <i>Springport.</i>       |
| Mary Laura Judd, <i>Mount Holyoke College</i> , Ph.B.,<br><i>University of Syracuse</i> , 1890,<br>Latin Literature; English Literature; Latin Philology. | <i>Holyoke, Mass.</i>    |
| Florence Bingham Kinne, A.B., 1887,<br>American Literature; Latin; Roman Political Antiquities.                                                           | <i>Ypsilanti.</i>        |
| Grace Lord Lamb, B.L., 1897, M.L., 1898,                                                                                                                  | <i>Erie, Pa.</i>         |
| Carl Frederick Augustus Lange, A.B., 1894,<br>A.M., <i>Harvard Univ.</i> , 1899,<br>Germanic Philology; German Literature; English Philology.             | <i>Saginaw.</i>          |
| Ruth Alberta Ludlow, A.B., <i>Albion College</i> , 1898,<br>English Literature; American Literature; Rhetoric.                                            | <i>Albion.</i>           |
| Norman King McInnis, A.B., 1898, A.M., 1899,<br>English Literature; Rhetoric; Aesthetics.                                                                 | <i>Saginaw.</i>          |
| Jessie Fremont Ruby McNeal, B.S., 1895,<br>M.D., 1897,                                                                                                    | <i>Alvordton, O.</i>     |
| Edward Clark Marsh, A.B., <i>Alma College</i> , 1896,<br>English Literature; Old English; Philosophy.                                                     | <i>Grand Rapids.</i>     |
| Ralph Clark Mason, B.L., 1897,                                                                                                                            | <i>Ann Arbor.</i>        |
| Yoshinaga Mikami, <i>Keio College</i> , 1897,<br>Political Economy; History; International Law.                                                           | <i>Kofu, Japan.</i>      |
| Aura Maud Miller, B.L., 1890, A.M., 1897,<br>English Literature; English Philology; Pedagogy.                                                             | <i>Ann Arbor.</i>        |

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Louallen Frederick Miller, B.S., 1899,<br>Physics; Analytical Chemistry; Mathematics.                                                                             | <i>Aurora, Ill.</i>   |
| Charles Rufus Morey, A.B., 1899,<br>Archæology; Greek; Latin.                                                                                                     | <i>Charlotte.</i>     |
| Seymour Tenny Morse, C.E., 1878,                                                                                                                                  | <i>Ann Arbor.</i>     |
| Marquis Joseph Newell, A.B., <i>Kalamazoo College</i> ,<br>1896, A.B., <i>University of Chicago</i> , 1899,<br>Mathematics; Pedagogy; Physics.                    | <i>Portage.</i>       |
| John Noordewier, A.B., 1899,<br>Hebrew; Assyrian; Latin.                                                                                                          | <i>Jenison.</i>       |
| Joanna Blessing Oliver, A.B., <i>Wellesley College</i> ,<br>1899,<br>Latin; History; Pedagogy.                                                                    | <i>Onawa, Ia.</i>     |
| Henry Hall Parke, B.L., 1898,<br>Experimental Zoology; Vertebrate Zoology; Botany.                                                                                | <i>Sycamore, Ill.</i> |
| Harlow Stafford Person, Ph.B., 1899, <i>Holder of<br/>the Peter White Fellowship in American<br/>History</i> ,<br>American History; Political Economy; Sociology. | <i>Lansing.</i>       |
| Carlotta Emma Pope, Ph.B., 1895,<br>American History; Latin; English Literature.                                                                                  | <i>Allegan.</i>       |
| †Harrison McAllester Randall, Ph.B., 1893,<br>Ph.M., 1894,<br>Physics; Mathematics; Physical Chemistry.                                                           | <i>Ann Arbor.</i>     |
| †Rena Bowne Raymond, A.B., 1900,<br>Botany; Vegetable Physiology; Zoology.                                                                                        | <i>Ann Arbor.</i>     |
| George Fletcher Richmond, B.S., <i>Michigan<br/>Agricultural College</i> , 1898,<br>General Chemistry; Analytical Chemistry; Physics.                             | <i>Belding.</i>       |
| †Walter John Risley, B.S., 1900,<br>Physics; Mathematics; Physical Chemistry.                                                                                     | <i>Logan, O.</i>      |
| †Gilbert Jeremiah Roberts, A.B., <i>Penn College</i> ,<br>1892, A.M., <i>ibid.</i> , 1899,<br>Latin; Greek; Philosophy.                                           | <i>Oskaloosa, Ia.</i> |
| †Christine Grace Robertson, A.B., 1900,<br>Latin; English Literature; Philosophy.                                                                                 | <i>Detroit.</i>       |
| †Ralph Loveland Roys, Ph.B., 1900,<br>French; American History; European History.                                                                                 | <i>Saginaw.</i>       |
| Herman Russell, B.S., 1898,<br>Analytical Chemistry; Organic Chemistry; Chemical Technology.                                                                      | <i>Manistee.</i>      |
| Helen Frances Sage, B.L., <i>University of Cin-<br/>cinnati</i> , 1899,<br>American History; English Literature; Pedagogy.                                        | <i>Cincinnati, O.</i> |

- Daniel Cornelius Schaffner, A.B., *College of Emporia*, 1898, *Morganville, Kan.*  
Geology; Mineralogy; Zoology.
- †Sophia Margaret Schwarz, Ph.B., 1900, *Aurora, Ill.*  
German Literature; Latin; Philosophy.
- Bertha Barbara Sciurus, B.L., 1893, *Saginaw, West Side.*
- \*Thomas Hall Shastid, M.D., *University of Vermont*, 1888, A.B., *Harvard Univ.*, 1893, *Battle Creek.*  
English Literature; English Philology; Pedagogy.
- William Hittell Sherzer, B.S., 1889, M.S., 1890, *Ypsilanti.*  
Geology; Zoology; Palæontology.
- Martin Simpson, B.S., *Olivet College*, 1899, *Deckerville.*  
Pedagogy; History of Education; Philosophy.
- John Willis Slaughter, A.B., *Lombard University*, 1898, B.D., *ibid.*, 1898, *Camp Hill, Ala.*  
Metaphysics; Psychology; Sociology.
- Ruth Louise Smith, B.S., 1899, *Marshall.*
- Shirley Wheeler Smith, B.L., 1897, *Ann Arbor.*  
American Literature; American History; Rhetoric.
- Carrie May Sperry, A.B., 1893, *Ann Arbor.*  
Latin; English Literature; Hygiene.
- Louis A. Strauss, B.L., 1893, Ph.M., 1894, *Ann Arbor.*  
English Literature; Rhetoric; Philosophy.
- James Wellings Sturgis, A.B., 1896, A.M., 1897, *Chicago, Ill.*  
Latin; Greek; Philosophy.
- †Grace Isabel Swindler, A.B., 1900, *Ann Arbor.*  
Greek; Latin; English Literature.
- LaMonte Taylor, A.B., *University of Kansas*, 1899, *Kansas City, Mo.*  
Latin; Greek; Pedagogy.
- Mary Grace Taylor, A.B., 1884, *Ann Arbor.*  
English Literature; English Philology; German Literature.
- Ralph Wendell Taylor, A.B., *Albion College*, 1896, *Hancock.*  
Philosophy; Pedagogy; Rhetoric.
- Mary Maclean Thompson, B.L., 1897, *Pontiac.*  
English Literature; Rhetoric; American History.
- Itsuo Tokunaga, *Doshisha College*, 1894, 1896, *Yanagawa, Japan.*  
Political Economy; Finance; History.
- Lila Turner, A.B., 1899, *Battle Creek.*  
American History; European History; English Literature.
- George Wagner, Ph.C., 1893, A.B., *University of Kansas*, 1899, *Lawrence, Kan.*
- May Walmsley, Ph.B., 1899, *LaGrange, Ill.*  
European History; American History; Sociology.

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- Frank Enos Welch, A.B., 1887, A.M., *Tulane University*, 1897, *Ann Arbor*.  
Germanic Philology; German Literature; French Philology.
- Frederick Henry Weng, Ph.B., 1898, *Marine City*.  
German; Latin; English Philology.
- Etta Rhoda Wilbur, B.S., 1895, *Lansing*.  
American History; German; English Literature.
- Mary Bessie Wiley, A.B., *Antioch College*, 1897, *Yellow Springs, O.*  
Latin; English Literature; Roman Political Antiquities.
- †Vernon Justin Willey, B.S., *Michigan Agricultural College*, 1893, *Lansing*.  
General Chemistry; Physics; Mathematics.
- †Eugene Cyrus Woodruff, B.S., 1894, M.S., 1896, *Ludington*.  
Physics; Mathematics; Organic Chemistry.

### Candidates for a Master's Degree Studying in Absentia.

| NAME.                                                                                          | RESIDENCE.              |
|------------------------------------------------------------------------------------------------|-------------------------|
| Mary Sophia Case, A.B., 1884,<br>British Philosophy; Political Philosophy; English Literature. | <i>Wellesley, Mass.</i> |
| Paul A. Cowgill, B.S., 1897,<br>Pedagogy; Vegetable Physiology; Zoology.                       | <i>Lapeer.</i>          |
| Adoniram Judson Ladd, A.B., 1894,<br>Pedagogy; English Literature; Rhetoric.                   | <i>Holland.</i>         |
| <i>Total, 100.</i>                                                                             |                         |

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UNIVERSITY OF MICHIGAN

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DEPARTMENT OF LITERATURE, SCIENCE,  
AND THE ARTS

---

GRADUATE SCHOOL

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ANNUAL ANNOUNCEMENT

FOR

1901-1902

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ANN ARBOR  
PUBLISHED BY THE UNIVERSITY  
1901

3875

UNIVERSITY OF MICHIGAN

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## CALENDAR.

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1901.

Sept. 18-21. *Examination for Admission to the Department of Literature, Science, and the Arts.*

Sept. 24. FIRST SEMESTER BEGINS IN ALL DEPARTMENTS OF THE UNIVERSITY.

Nov. — Thanksgiving Recess of three days, beginning Tuesday evening, in all Departments of the University.

Dec. 20. (Evening) Holiday Vacation begins in all Departments.

1902.

Jan. 7. Exercises resumed.

Feb. 7. (Evening) FIRST SEMESTER CLOSES.

Feb. 10. SECOND SEMESTER BEGINS.

April 11. (Evening) Recess begins, ending April 21 (evening).

June 19. COMMENCEMENT IN ALL DEPARTMENTS OF THE UNIVERSITY.

## ADMINISTRATIVE COUNCIL.

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JAMES B. ANGELL, LL.D., *President.*

ALBERT B. PRESCOTT, M.D., LL.D., *Director of the Chemical Laboratory, and Professor of Organic Chemistry.*

REV. MARTIN L. D'OUGE, LL.D., *Professor of the Greek Language and Literature.*

WILLIAM H. PETTEE, A.M., *Professor of Mineralogy, Economic Geology, and Mining Engineering.*

ISAAC N. DEMMON, LL.D., *Professor of English and Rhetoric.*

ALBERT H. PATTENGILL, A.M., *Professor of Greek.*

WOOSTER W. BEMAN, A.M., *Professor of Mathematics.*

VICTOR C. VAUGHAN, M.D., LL.D., *Professor of Hygiene and Physiological Chemistry, and Director of the Hygienic Laboratory.*

CHARLES S. DENISON, M.S., C.E., *Professor of Descriptive Geometry, Stereotomy, and Drawing.*

HENRY S. CARHART, LL.D., *Professor of Physics, and Director of the Physical Laboratory.*

VOLNEY M. SPALDING, Ph.D., *Professor of Botany.*

HENRY C. ADAMS, LL.D., *Professor of Political Economy and Finance.*

RICHARD HUDSON, A.M., *Professor of History, and Dean of the Department of Literature, Science, and the Arts.*

ALBERT A. STANLEY, A.M., *Professor of Music.*

FRANCIS W. KELSEY, Ph.D., *Professor of the Latin Language and Literature.*

OTIS C. JOHNSON, Ph.D., A.M., *Professor of Applied Chemistry.*

PAUL C. FREER, Ph.D., M.D., *Professor of General Chemistry, and Director of the Laboratory of General Chemistry.*

ANDREW C. McLAUGHLIN, A.M., LL.B., *Professor of American History.*

ASAPH HALL, JR., Ph.D., *Professor of Astronomy and Director of the Observatory.*

ISRAEL C. RUSSELL, C.E., LL.D., *Professor of Geology.*

WARREN P. LOMBARD, A.B., M.D., *Professor of Physiology.*

JACOB REIGHARD, PH.B., *Professor of Zoology, and Director of the Zoological Laboratory and the Zoological Museum.*

THOMAS C. TRUEBLOOD, A.M., *Professor of Elocution and Oratory.*

JAMES A. CRAIG, PH.D., *Professor of Semitic Languages and Literatures and Hellenistic Greek.*

JOHN C. ROLFE, PH.D., *Professor of Latin.*

J. PLAYFAIR McMURRICH, PH.D., *Professor of Anatomy.*

ROBERT M. WENLEY, Sc.D., D.PHIL., *Professor of Philosophy.*

ELIZA M. MOSHER, M.D., *Professor of Hygiene.*

GEORGE HEMPL, PH.D., *Professor of English Philology and General Linguistics.*

ARTHUR G. CANFIELD, A.M., *Professor of Romance Languages and Literatures.*

WILLIAM H. PAYNE, LL.D., *Professor of the Science and the Art of Teaching.*

MAX WINKLER, PH.D., *Acting Professor of German.*

FREDERICK G. NOVY, Sc.D., M.D., *Junior Professor of Hygiene and Physiological Chemistry.*

EDWARD D. CAMPBELL, B.S., *Junior Professor of Analytical Chemistry.*

FRED M. TAYLOR, PH.D., *Junior Professor of Political Economy and Finance.*

FRED N. SCOTT, PH.D., *Junior Professor of Rhetoric.*

ALEXANDER ZIWET, C.E., *Junior Professor of Mathematics.*

GEORGE W. PATTERSON, JR., PH.D., *Junior Professor of Electrical Engineering.*

FREDERICK C. NEWCOMBE, PH.D., *Junior Professor of Botany.*

ALLEN S. WHITNEY, A.B., *Junior Professor of the Science and the Art of Teaching.*

G. CARL HUBER, M.D., *Junior Professor of Anatomy.*

JOHN O. REED, PH.D., *Junior Professor of Physics.*

ALFRED H. LLOYD, PH.D., *Junior Professor of Philosophy.*

CHARLES H. COOLEY, PH.D., *Assistant Professor of Sociology.*

# **ANNOUNCEMENT OF THE GRADUATE SCHOOL.**

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## **GENERAL INFORMATION.**

### **The University of Michigan.**

The University of Michigan is a part of the educational system of the State, and derives from the State, in one way or another, the greater part of its revenue. The University comprises the Department of Literature, Science, and the Arts, and six professional schools, each of which has its own Faculty and issues each year a separate departmental Announcement. In the several faculties there were in 1900-1901 166 officers of instruction, besides numerous assistants, some of whom participated in the work of teaching. Including the Summer Schools, 3,712 students, representing 49 States and Territories, and 10 foreign countries were in attendance.

### **The Department of Literature, Science, and the Arts.**

In the Department of Literature, Science, and the Arts, the aim is to cover the broad field of general university study of the ancient and the modern languages and literatures, of history, philosophy, science, and the liberal arts, as distinguished from the more special work of the professional schools. Its Faculty numbered, in 1900-1901, 98 regular teachers and 22 assistants. The students in attendance numbered 1369, of whom 108 were graduates. The presence of such a number of graduate students, taken with the fact that high specialization of work is not uncommon among undergraduates, tends to create a genuine university atmosphere, and to assure the advanced student of intellectual comradeship.

### **The Libraries.**

The various libraries of the University contain about 150,000 volumes, and include a number of important special collections.

Among these are the McMillan Shakespeare Library, 4,938 volumes; the Parsons Library (political science), 4,325 volumes; and the Goethe Library of about 1,000 volumes. The general reading room seats 210 readers, and separate rooms are provided for advanced students to work in, with the necessary books close at hand. Under certain restrictions graduate students have access to the book rooms. The library takes 818 periodicals, and is open, in term time, fourteen hours daily, except on Sundays and legal holidays. During the summer vacation it is open nine hours a day for the remainder of the time.

### **The Laboratories.**

The University has an observatory and a large number of laboratories more or less fully equipped for routine instruction and for original research. The laboratories (omitting those connected exclusively with the work of the Engineering, Medical, and Dental Schools) are: the Anatomical, Botanical, Chemical, Geological, Histological, Hygienic, Physical, Physiological, Psychological, and Zoological. For a fuller account of them and their various resources, as also of the University collections for the study of art, archæology, ethnology, mineralogy, palæontology, systematic zoology, etc., consult the annual Calendar, which may be had *gratis* on application to Mr. James H. Wade, Secretary of the University.

### **Societies.**

There are connected with the University a number of voluntary literary, philosophical, and scientific organizations which add not a little to the graduate student's opportunity for general training. The membership of these societies consists usually of University teachers and advanced students who are pursuing a common specialty. They are variously organized and meet weekly, fortnightly, or monthly, as the case may be, for the reading and discussion of formal papers, for reports upon observation and experiment, reviews of recent literature, etc.

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## **ORGANIZATION OF GRADUATE WORK.**

### **The Graduate School.**

The Graduate School was organized in the Spring of 1892 in connection with the Department of Literature, Science, and the Arts. Its purpose is to bring into increased prominence the numerous ad-



vanced courses offered in that department—courses that have developed during the past few years from the continual extension of the elective system,—and to recognize and announce them as something distinct from the work of an ordinary college course. It aims to make provision for a more systematic and efficient administration of the higher work, and, so far as possible, for the separate instruction of graduate students. It also aims to lay foundations for the future development of university (as distinguished from collegiate) work. The management of the School is entrusted to an Administrative Council, of which the President of the University is chairman.

The regulations of the University respecting graduate work that were formerly in force, have been modified in a few particulars by the Council, and it is possible that still further changes may be made in the year to come. The more important of these regulations are explained in the pages that follow.

### **The University System.**

Every graduate student who is a candidate for a higher degree, works upon the so-called 'university system,' the essential features of which are specialization of study, a final examination, and a thesis. The student selects a 'major study' and, in general, two 'minor studies,' his selection being subject, however, to the approval of the Council. When the choice has been made and approved, the student's work is henceforth under the immediate supervision of a committee consisting of those professors who have charge of the studies chosen, the one having charge of the major study being chairman. This committee arranges a course of study suited to the desires, needs, and previous attainments of the student, assists him in the choice of a subject for a thesis, passes judgment upon his thesis when it is written, conducts his examination, and, if he passes, reports him to the Council as worthy of the degree sought. The nature of the work prescribed, and of the committee's oversight, varies more or less according to the subject chosen, the degree sought, and the previous attainments of the student. The work may consist of attendance upon certain specified courses of study, of reading to be done privately and reported upon, or of an original research to be carried on more or less independently. The requirement of a thesis is sometimes waived in the case of a candidate for a *master's* degree. It may be added also that for the master's degree the Council may, at its discretion, approve a course of study which does not confine the candidate rigorously to a major and two minor studies.

Graduate students who do not wish to work for a higher degree

are admitted to any course offered in the Department of Literature, Science, and the Arts, upon satisfying the professor in charge that they are qualified to pursue the work to advantage.

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## THE HIGHER DEGREES.

### Degrees Conferred.

The degrees conferred on the completion of approved courses of study in the Graduate School are those of Master of Arts, Master of Science, Doctor of Philosophy, and Doctor of Science.

### The Masters' Degrees.

A Bachelor of this University, or of any other reputable university or college, may become a candidate for a master's degree, and may be recommended for the degree after one year's residence at the University, provided he pass a satisfactory examination on the course of study approved by the Administrative Council. A thesis may, or may not, be included in the requirements for a degree, as the committee in charge of the student's work may determine.

The degree of Master of Arts is the one usually conferred, though candidates who pursue studies along scientific lines may, at their option, receive the degree of Master of Science.

The practice of allowing graduates of this University to enter upon studies *in absentia* as candidates for a master's degree, has been discontinued. But a graduate who has already completed a considerable portion of the term of residence prescribed for a master's degree, may be allowed to continue his studies for the degree, without further residence at the University, on such conditions as the Administrative Council may determine in each case. *This privilege is restricted to graduates of this University.*

A student properly qualified may be permitted to pursue at the same time studies for a master's degree and studies in any of the professional schools, on condition that the term of study and residence in the Graduate School be extended to cover at least two years.

### The Doctors' Degrees.

1. The doctors' degrees are open to all persons who have received a bachelor's degree, but no student will be accepted as a candidate for a doctor's degree who has not a knowledge of French and German sufficient for purposes of research. The degree of Doctor of Philosophy is the one usually conferred, though candidates who pursue

studies along scientific lines may, at their option, receive the degree of Doctor of Science.

2. It is not intended that the doctor's degree shall be won merely by faithful and industrious work for a prescribed time in some assigned course of study, and no definite term of required residence can be specified. As a rule, three years of graduate study will be necessary, the last two semesters of which must be spent at this University. The period of three years, however, may be shortened in the case of students who, as undergraduates, have pursued special studies in the direction of their proposed graduate work.

3. No student will be enrolled as a candidate for a doctor's degree until he has been in residence as a graduate student for at least one year. [This rule may be waived in the case of those who come properly accredited from a Graduate School of some other university, and of those who, as undergraduates in this University, have shown special proficiency in the line of their proposed graduate work.]

4. A student wishing to become a candidate for a doctor's degree must make a formal application to be so enrolled at least two semesters prior to the time for presenting himself for examination.

5. A candidate for a doctor's degree must take a major study that is substantially co-extensive with some one department of instruction in the University. He must also take two minor studies, one of which may be in the same department as the major, but involving a more thorough treatment of the same. Both minors must be cognate to the major, and all studies must be subject to the approval of the Administrative Council.

6. THE THESIS.—The thesis is of great importance. It must exhibit creditable literary workmanship, and a good command of the resources of expression, but it must depend for acceptance more upon its subject-matter than upon its formal or rhetorical qualities. It must be an original contribution to scholarship or to scientific knowledge. The inquiry should be confined within narrow bounds. The treatment should be as concise as the nature of the subject permits, and show familiarity with the history of the problem treated, with the literature bearing upon it, and with the latest methods of research applicable to it. Every thesis should contain a clear introductory statement of what it is proposed to establish or investigate, and likewise a final résumé of results. It should also be accompanied by an index of contents and a bibliography of the subject. It is expected that the preparation of an acceptable thesis will usually require the greater part of an academic year.

**Special Regulations Relating to the Higher Degrees.**

1. Applicants for an advanced degree are required to announce to the Council, through the Secretary, as early as the tenth of October of each year, the particular branches of study to which they wish to give special attention. The supervision of their work will then be entrusted to the proper committee.

2. The subject of the thesis for a doctor's degree must be chosen, and must be approved by the committee concerned, as early as the first of November of the college year in which the applicant expects to take his degree, and the subject of the thesis for a master's degree, when required, must be chosen and approved as early as the first of December.

3. The thesis must be completed and put into the hands of the chairman of the proper committee as early as the first of May of the year in which the applicant expects to take the degree.

4. The thesis must be prepared for close scrutiny with reference not only to its technical merits, but also to its merits as a specimen of literary workmanship. It must be preceded by an analytical table of contents, and a carefully prepared account of the authorities made use of.

5. The thesis must be read and defended in public at such time as the Council may appoint; and, in case of a master's degree, a bound copy, either written or printed, must be deposited in the University library.

6. Every candidate for the degree of Doctor of Philosophy or Doctor of Science, in case of the acceptance of his thesis, is required to have the thesis printed in full or in part, as may be approved by the responsible committee. He is also required to deposit one hundred and fifty copies of the printed thesis in the University library, these copies to be used for exchange with other universities; — provided, however, that in cases where this requirement would work hardship, it may be waived on recommendation of the candidate's committee. To guarantee the printing of the thesis, every candidate for the doctor's degree is required to deposit with the Treasurer of the University, between the date of the acceptance of the thesis and the time fixed for his examination, the sum of fifty dollars, which deposit will be returned to him in case of failure to pass his examination, or whenever he shall cause his thesis to be printed at his own expense, or shall have it published in a form and under auspices approved by the responsible committee. In case the thesis is not immediately printed, a type-written copy must be placed in the University library.

In the printing of the thesis at his own expense the candidate will be expected to use good, substantial paper, and slightly typography. A page four inches by six, with outside margins of at least one inch, is recommended.

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## ADMISSION AND REGISTRATION.

All applicants for admission to the Graduate School must first report to the Dean of the Department of Literature, Science, and the Arts, and present their credentials. They will then be referred to the Secretary of the Administrative Council for the arrangement of courses of study.

The privileges of the school are open to graduates of the Department of Literature, Science, and the Arts of this University, and to graduates of other universities and colleges who satisfy the Administrative Council that they are qualified to pursue with profit the advanced courses of study offered in the school.

Graduates of institutions where the undergraduate courses of study are not substantially equivalent to the course prescribed at this University, are ordinarily required to do an additional amount of undergraduate work, or to prolong their term of residence, before being admitted to full candidacy for a higher degree.

Graduates of this University, or of other institutions, who do not wish to become candidates for a degree, may be admitted and registered as special resident graduates.

Graduates of other institutions who are candidates for a bachelor's degree in the Department of Literature, Science, and the Arts, are not registered in the Graduate School.

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## FEEES AND EXPENSES.

**Matriculation Fee.**—Every student before entering any department of the University is required to pay a matriculation fee. This fee, which for citizens of Michigan, is ten dollars, and for those who come from any other state or country, twenty-five dollars, is paid but once, and entitles the student to the privileges of permanent membership in the University.

**Annual Fee.**—In addition to the matriculation fee, every student has to pay an annual fee for incidental expenses. This fee in the Department of Literature, Science, and the Arts is, for Michigan students, thirty dollars; for all others, forty dollars. It is paid the

first year of residence at the University, and every year of residence thereafter. Resident graduates are required to pay the same annual fee as undergraduates. Graduate students studying *in absentia* for a master's degree pay an annual fee of ten dollars.

The matriculation fee and the annual fee must be paid at the beginning of the academic year. A by-law of the Board of Regents provides that no student or graduate shall be allowed to enjoy the privileges of the University until he has paid all fees that are due.

**Laboratory Expenses.**—Students who pursue laboratory courses of study are required to pay for the materials and apparatus actually consumed by them. The deposits required in advance are different in the different courses, ranging from one to twenty dollars. The laboratory expenses of students will vary with their prudence and economy. Experience has shown that in the chemical laboratory the average expense for all courses is about one dollar and twenty cents a week.

**Diploma Fee.**—The fee for the diploma given on graduation is ten dollars, and the by-laws of the Board of Regents prescribe that no person shall be recommended for a degree until he has paid all dues, including the fee for diploma.

**Other Expenses.**—Students obtain board and lodging in private families for from three to five dollars a week. Clubs are also formed in which the cost of board is from one dollar and a half to two dollars and a half a week. Room rent varies from one dollar to three dollars a week for each student. The annual expenses of students, including clothing and incidentals, are, on the average, about three hundred and seventy dollars. Students on arriving in Ann Arbor can obtain information in regard to rooms and board by calling at the office of the Secretary of the University in University Hall.

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## FELLOWSHIPS.

### **Elisha Jones Classical Fellowship.**

In 1889 the Elisha Jones Classical Fellowship was established by Mrs. Catherine E. Jones, in memory of her husband, Professor Elisha Jones, a graduate of this University, in the class of 1859, and for many years a member of the Literary Faculty. Its purpose is "to encourage patient, honest, accurate study of the languages, literature, and archæology of ancient Greece and Rome.

A candidate for the Fellowship must have spent at least three entire semesters as a student in this Department of the University, and

must be a Bachelor of Arts of this University of not more than two years' standing. Appointments to the Fellowship are made by an Examining Board, consisting of President ANGELL and Professors D'Ooge, KELSEY, HUDSON, and PATTENGILL. The period of incumbency is limited to two academic years, and must be spent at this University "unless at any time the examining board shall see fit to allow the second year to be spent" at some other place favorable to classical study.

#### **Fellowship in Chemistry.**

The sum of five hundred dollars has been given by Messrs. Parke, Davis and Company, of Detroit, for the continuation in the year 1901-1902 of the Fellowship in Chemistry established by them in 1895. Professors VAUGHAN, PRESCOTT, and FREER have been designated to act as a committee to select the incumbent and to arrange the work in accordance with the wishes of the donors. The holder of the Fellowship for the current year is Hudson Sheldon, A.M.

#### **Peter White Fellowship.**

Provision for a Fellowship in American History for the year 1901-1902, with an income of four hundred dollars, has been made by Honorable Peter White, of Marquette. The present holder of the Fellowship is Miss Winifred Beman, A.B.

#### **Dexter M. Ferry Botanical Fellowship.**

Provision for a Fellowship in Botany for the year 1901-1902, with an income of five hundred dollars, has been made by Mr. Dexter M. Ferry, of Detroit. The present holder of the Fellowship is Joseph William Tell Duvel, B.S.

#### **Stearns Fellowship.**

The sum of three hundred and fifty dollars has been given by Messrs. Frederick Stearns and Company, of Detroit, for the continuation in the year 1901-1902 of the Fellowship in Pharmaceutical Chemistry established by them in 1895.

#### **Gas Engineering Fellowship.**

Members of the Michigan State Gas Association have subscribed the sum of six hundred dollars for the support of a Fellowship in Gas Engineering during the year 1901-1902, five hundred dollars of this sum to be given to the holder of the Fellowship, the remainder to be

expended for special apparatus and material required for the research. The holder of the Fellowship for the current year is Herman Russell, M.S.

## COURSES OF INSTRUCTION

The following list of advanced courses does not attempt in all cases to discriminate graduate from undergraduate instruction; the reason being that the possession of a bachelor's degree may mean much or little as regards a student's proficiency in a particular subject. With a few exceptions, the courses here mentioned all presuppose a somewhat extensive preliminary study of the subject, a study covering from one to six or more years according to the circumstances. In some instances the attempt is made to indicate, in terms of both time and work, the amount of preparation required for entrance upon the courses described. Many of the courses are advanced electives which are open to undergraduates, but have been shown by experience to be suited to the needs of many graduates. Different departments of instruction have adopted different modes of announcing their work. For further information reference may be made directly to the head of the department concerned.

### Greek.

The courses here announced presuppose, in general, four years' previous study of Greek, viz., the usual preparatory course of two years, and two years of collegiate study devoted to the history of Greek literature and to reading from Lysias, Xenophon, Homer, Demosthenes, the Tragic Poets, and Aristophanes.

### FIRST SEMESTER.

Professor D'Ooge:—

#### Seminary in Tragedy.

The Oresteian Trilogy of Æschylus, with special reference to the principles of Greek dramatic art.—*Three hours a week.*

#### [Seminary in Tragedy.

Studies in Euripides, with special reference to the dramatic art of the poet, his relation to his own times, his meters, and his dramatic innovations.]

Omitted in 1901-1902; to be given in 1902-1903.



The History of Greek Art from the Beginning to the Roman Period.

Gardner's Handbook of Greek Sculpture and Tarbell's History of Greek art will be made the basis of a more general study.—  
*Three hours a week.*

[The Nicomachean Ethics of Aristotle.

Books I-IV and X.

Omitted in 1901-1902; to be given in 1902-1903.

Reports on Classical Philology.

Throughout the year members of the Classical Faculty and the graduate students meet once a week to present and to hear analyses and reviews in the domain of the Greek and Latin languages and literatures, and reports of recent researches and explorations in Greek and Roman Archæology, history, and antiquities.

Professor PATTENGILL:—

The Athenian Constitution of Aristotle.

With special reference to the judicial and political antiquities of Athens.—*Two hours a week.*

Dr. WAIT:—

Introduction to Greek Epigraphy, and Reading of Inscriptions.

*Two hours a week, second semester.*

## SECOND SEMESTER

Professor D'OUGE:—

Pindar (the Olympian and Pythian Odes) and Bacchylides.

*Three hours a week.*

Greek Antiquities.

Lectures on the monuments and the private life of the ancient Athenians. Illustrated by stereopticon views.—*One hour a week.*

[Introduction to Homer.

A study of the peculiarities of the epic dialect and the Homeric verse. Intended especially for those who expect to teach Greek.—]

Omitted in 1901-1902; to be given in 1902-1903.

Modern Greek. Reading of selections from representative authors.

*Two hours a week.*

## [Seminary in Plato's Republic.]

*Two hours a week.*

Omitted in 1901-1902; to be given in 1902-1903.

## Professor PATTENGILL:—

## [Theocritus, Bion, and Moschus.]

*Three hours a week.*

Omitted in 1901-1902; to be given in 1902-1903.

## The Greek Minor Poets.

*Three hours a week.*

## Latin.

The courses here announced presuppose, in general, seven or eight years' previous study of Latin, viz., the usual preparatory course of four years, and three or four years of collegiate study devoted to Livy, Cicero, Horace, Terence, Latin writing, and the systematic study of Roman literature.

The courses in ancient philosophy (see pages 35-38) and the course in the Principles of Linguistic Science (see pages 27-28) are strongly recommended to classical students.

## Professor KELSEY:—

## Caesar's Gallic War (Teachers' Course, A).

Lectures. Papers prepared by those taking the course. Critical study of the text of the Gallic War, on the basis of Meusel's edition; studies in the syntax and military antiquities.—*Five hours a week, first semester.*

## Virgil (Teachers' Course, B).

Critical study of select portions of the Bucolics, Georgics, and Aeneid, on the basis of Ribbeck's large edition.—*Five hours a week, second semester.*

## [Introduction to Classical Philology.]

Lectures. A brief outline of the history and present condition of classical studies is presented, followed by an extended discussion of the methods employed in classical philology. Attention is also paid to the bibliography of the subject.—*Three hours a week, second semester.* This course will be omitted in 1901-1902.]

## Introduction to Roman Archæology.

Lectures on the architecture and topography of Ancient Rome, and on sculpture and painting in the Roman period. This course will be illustrated by photographs, engravings, and the occasional

use of stereopticon slides.— *Four hours a week, second semester.*

Lucretius.

Interpretation and lectures.— *Two hours a week, first semester.*

Latin Seminary: Lucretius.

Open to graduate students only.— *Two hours a week, throughout the year.*

Professor ROLFE: —

Latin Grammar.

Lectures on the phonology and morphology of the Latin language, with an outline of the syntax scientifically considered.— *Three hours a week, first semester.*

Latin Inscriptions.

Reading of inscriptions of different periods illustrating the history of the Latin language.— *Two hours a week, second semester.*

The Italic Dialects.

Lectures on the phonology and morphology of the dialects, with the interpretation of selected inscriptions.— *Two hours a week, second semester.*

[Vulgar Latin.

Lectures on the *sermo cottidianus* and *sermo plebeius*, with special reference to the Romance Languages. Reading of selected authors and inscriptions.— *Three hours a week, first semester.*  
This course will be omitted in 1901-1902.]

Professor ROLFE and Assistant Professor DRAKE: —

Reviews of Roman Literature, Latin Grammar, and Roman Legal and Political Institutions.

Systematic reviews of the subjects mentioned in the title to this course will be given for the benefit of students preparing for graduate examinations, or for the fellowships at Rome or elsewhere, for which an examination is a prerequisite.— *One hour a week, second semester.*

Assistant Professor DRAKE: —

History of Roman Private Law.

Lectures. A sketch of the development of Roman Private Law, and of the relations of Private to Public Law up to the death of Justinian; some accounts of Roman Law in the Middle Ages, and a discussion of the relations of Roman Law to modern systems of law.— *One hour a week, first semester.*

### Roman Constitutional Law.

Lectures. This course deals with the Roman constitution up to and including the Augustan age. Special attention will be given to the reason for the failure of the constitution of the Republic, and to the establishment of the Principate by Augustus. Points of resemblance to the American constitution will be noted whenever it is possible.— *Two hours a week, first semester.*

### The Institutes of Roman Private Law.

Lectures. An outline of the fundamental principles of Roman Law as given in the institutes of Gaius and Justinian. Special emphasis will be placed on points of Roman Law which illustrate principles of English law.— *Two hours a week, second semester.*

### Roman Administrative Law.

Lectures. An outline of the administrative system of the Roman Provinces, preceded by a short account of the geographical extension of Rome through her conquests, and followed by a consideration of the effect of provincial development upon the life of the state, of the reorganization of the administration by Augustus and by Diocletian, and a sketch of the later history of the provinces.— *One hour a week, second semester.*

### Proseminary in Roman Constitutional Law.

Lectures, topical readings and reports on assigned subjects in Roman constitutional development. The general theme of the course in 1901-1902 will be the Progressive Subdivision of the Magistracy as portrayed in the earlier books of Livy.— *Two hours a week, first semester.*

Dr. SANDERS and Dr. MEADER: —.

#### Latin Writing (A).

Attention is given not only to correctness of expression, but also to matters of style and the finer distinctions of the language.— *Two hours a week, first semester.*

#### Latin Writing (B).

Lectures on Latin style, with collateral reading and written exercises.— *Two hours a week, second semester.*

Dr. SANDERS: —

#### Introduction to Latin Palæography.

Lectures on the various styles of writing found in Latin manu-

scripts, with exercises in reading from facsimiles.— *Two hours a week, first semester.*

The Georgics of Virgil.

Interpretations with lectures on the ancient writers on agriculture.— *Two hours a week, second semester.*

Dr. MEADER:—

The Pseudo-Cæsarian Bellum Africanum and Bellum Hispaniense.

Interpretation of the texts and critical study of their syntactical and stylistic peculiarities, accompanied by a continual comparison with the usages of Cæsar. *Two hours a week, first semester.*

Latin Comedy.

Selected plays of Plautus and Terence.— *Two hours a week, second semester.*

### Sanskrit.

Before beginning the study of Sanskrit, the student should have pursued courses in Greek and Latin for at least four semesters, or, instead of either Greek or Latin, Germanics of the early period.

Dr. WAIT:—

Beginners' Course.

Grammar, and exercises in translation and composition. Text-books: Perry's Sanskrit Primer and Whitney's Grammar.— *Three hours a week, first semester.*

Second Course.

Interpretation of the prose selections contained in Lanman's Sanskrit Reader, with elementary studies in the comparative morphology of the more important cognate languages.— *Three hours a week, second semester.*

### Semitics.

The courses in Semitics are intended for:— (1) students who are seeking a liberal culture; (2) students of "classical" and modern languages, to furnish them with *necessary* data for the study of the philosophy of language and phonetic laws; (3) students who wish to make a special study of Semitics (the courses leading to the degree of Doctor of Philosophy); (4) students of ancient history; (5) students of art and archæology; (6) students of ethics and theology.

Professor CRAIG:—

### Hebrew.\*

1. Genesis. Baer and Delitzsch's Text. Gesenius' Hebrew Grammar by Kautzsch, trans. by Collins, 26th Edition. Craig's Hebrew Word Manual.—*Three hours a week, first semester.*

2. Deuteronomy, Joshua, I Samuel, Ruth, Jonah. Theile's Biblia Hebraica. Gesenius' Lexicon.—*Three hours a week, second semester.*

3. Prophetic Literature: Amos and Isaiah. Study of the nature and content of prophecy in its literary, historical, and ethical aspects. Text-books: Hebrew Bible, Driver's Hebrew Moods and Tenses.—*Two hours a week, first semester.*

4. The Book of Job, including study of the literary structure and critique of the dominant ideas. Baer and Delitzsch's Text and Haupt's Polychrome Edition (text by Siegfried).—*Two hours a week, second semester.*

### Assyrian.

1. Introduction to Easy Historical Inscriptions from the Ninth Century, B. C., with study of the grammar. Text-books: Delitzsch's Assyrische Lesestücke, vierte Auflage.—*Three hours a week, first semester.*

2. Historical Inscriptions. Selections from the Cuneiform Inscriptions of Western Asia (R. I–V).—*Second semester.*

3. The Babylonian Stories of Creation, the Deluge, and the War of Marduk against Tiamat, with lectures on the Cosmology of the Babylonians. Inscription of Tiglathpileser I, circa 1120 B. C.—*Two hours a week, first semester.*

4. Religious Literature. King's "The Prayers of the Lifting-up of the Hand." Craig's "Religious Texts."—*Second semester.*

5. Seminary in Sumerian.—*Two hours a week, first semester.*

### History and Archæology.

(1) Lectures on the Ancient Babylonians, Assyrians, Hebrews, Phœnicians. The lectures are based on the study of the monuments.—*Two hours a week, first semester.*

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\* Candidates for a higher degree who wish to elect a Semitic language as one of the subjects leading to the degree, must have previously completed Courses 1 and 2 in Hebrew, or an equivalent thereto in some Semitic language.

(2) Lectures on the History of Israel and Judah from earliest times to the Reformation of Ezra.

(3) Lectures. Introduction to the study of the Old Testament.

(4) Lectures. Study of the prophetic books of the Old Testament.

(5) Special Lectures. See Announcement.

### Arabic.

1. Introductory Course. Grammar and reading. Socin's Arabic Grammar (English edition) and Brünnow's Chrestomathy.— *Two hours a week, second semester.*

2. Selected Suras from the Quran, Chrestomathia Qurani Arabica, Nallino, with introductory lectures on the life of Muhammed and Muhammedanism.— *Two hours a week, first semester.*

### Aramaic, Syriac, Ethiopic.

Courses in Aramaic, Syriac, Ethiopic are arranged to suit the needs of advanced students.

### Hellenistic Greek.

Professor CRAIG:—

#### New Testament.

Gospel of John, including grammatical study of the peculiarities of Hellenistic Greek, and historical introduction to the book. Text-Books: Westcott and Hort's Greek New Testament, revised edition with introduction by Ph. Schaff; Thayer's Winer's New Testament Grammar; Blass' Grammar of New Testament Greek; Thayer's Greek-English Lexicon.— *Two hours a week, first semester.*

#### Septuagint.

Introductory lectures with selected readings from the historical and prophetic books. Apocrypha; Maccabees, Books I and II. Text-books: Vetus Testamentum Græce by L. Van Ess, or The Old Testament in Greek, by H. B. Swete, Vols. I–III. Grammar and lexicon as in the first semester, and Liddell and Scott's Lexicon.— *Two hours a week, second semester.*

### French.

The advanced and graduate courses here described presuppose in general three years' previous collegiate study of French. The minimum requirement of undergraduate preparation is represented by courses 1, 2, 3, 4, 5, and 6, described in the University Calendar for 1900–1901, pages 68–70.

**Professor CANFIELD:—****Poetry of the Nineteenth Century.**

This course deals with the main aspects of poetry in France from the beginnings of Romanticism to the present time. The chief and representative poets are studied in connection with the currents of thought of the time. Lectures, reading and discussions. Open to undergraduates and graduates.—*Three hours a week, first semester.*

**The Growth of Realism in the Nineteenth Century, Especially in the Novel.**

This course involves a study of the transition from Romanticism to Realism, of the relation of Realism to the preceding movement, and of the influences that contributed to ascendancy. Lectures, reading, and discussions. Open to undergraduates and graduates.—*Three hours a week, second semester.*

**Proseminary in French Literature.**

The beginnings of literary criticism in France; the formation of the classical doctrine. Studies in the development of literary ideas in France. Primarily for graduates.—*Two hours a week, first semester.*

**Historical French Grammar.**

Lectures on Phonology and Morphology, and reading of Old French texts. For undergraduates and graduates.—*Two hours a week, throughout the year.*

**History of French Literature to the End of the Fifteenth Century.**

Lectures, reading, and reports. Primarily for graduates.—*Two hours a week, first semester.*

**Assistant Professor DE PONT:—****Dramatists of the Eighteenth Century.**

Lectures and reports. This course is designed to furnish a survey of the French drama from the Classical to the Romantic School. For undergraduates and graduates.—*Two hours a week, second semester.*

**Assistant Professor LEVI:—****History of French Literature in the Seventeenth, Eighteenth, and Nineteenth Centuries.**



A general survey. Lectures, reports, reading. For undergraduates and graduates.—*Two hours a week, throughout the year.*

Assistant Professor EFFINGER:—

The Dramatic Literature of the Nineteenth Century.

This course will comprehend a study of the drama in the nineteenth century, beginning with the theatre of the Revolution and the melo-drama, and covering the romantic movement, the classical reaction, and the rise of the modern school. For graduates and undergraduates.—*Three hours a week, throughout the year.*

Dr. THIEME:—

French Literature of the Sixteenth Century.

This course treats the transitions from the Middle Ages to the Renaissance and from the Sixteenth to the Seventeenth Century, with special study of Marot, Ronsard, Rabelais, Montaigne, Calvin, Jodelle, Garnier, and Hardy. Lectures, reading, reports. For undergraduates and graduates.—*Three hours a week, first semester.*

### Provençal.

Professor CANFIELD:—

Outline of the Grammar, with readings in Appel's *Provenzalische Chrestomathie*. Primarily for graduates.—*Two hours a week, second semester.*

### Italian.

The minimum requirement for admission to the courses announced below consists in courses 1 and 2 described in the University Calendar for 1900-1901, page 70, or an equivalent.

Assistant Professor LEVI:—

Dante: *La Vita Nuova*.

For undergraduates and graduates.—*One hour a week, first semester.*

Dante: *La Divina Commedia*.

Lectures on the life and works of Dante with special reference to the interpretation of the Divine Comedy. Recitations and reports on assigned reading. For undergraduates and graduates.—*Three hours a week, second semester.*

### Spanish.

The minimum requirement for entrance to the advanced courses in Spanish, announced below, consists in courses 1 and 2, described in the University Calendar for 1900-1901, page 70, or an equivalent.

Cervantes: *Novelas Ejemplares*.

*Two hours a week, first semester.*

History of Spanish Literature in the Sixteenth and Seventeenth Centuries.

Lectures and readings.—*Two hours a week, second semester.*

### German.

The advanced and graduate courses in German, announced below, presuppose a reasonably thorough and extended knowledge of the written and spoken language, and an acquaintance with some of the masterpieces of modern German literature, both of which may be obtained from the undergraduate work not here mentioned. The minimum requirement of undergraduate preparation for the graduate courses consists in Courses 1, 2, 3, 4, 5<sub>1</sub>, 6<sub>1</sub>, and options in 5a, 5b, 6a, and 6b, as described in the University Calendar for 1900-1901, pages 71-73, or work equivalent to the courses mentioned.

Courses 5a, 5b, 6a, and 6b are primarily intended for undergraduates, and are recommended for graduates who wish to study the chief dramas of the classical period.

Professor WINKLER:—

Goethe's *Faust*.

Lectures and recitations. Thomas's edition. The drama is studied as a work of art, and the life and thoughts of Goethe, affording the basis for its interpretation, are carefully reviewed and analyzed. An excellent Goethe library, which contains the most important critical material on *Faust*, affords ample opportunity for special study. Advanced course open to undergraduates and graduates.—*Two hours a week, throughout the year.*

History of German Literature.

Lectures and readings from Max Müller's *German Classics*. A survey of German literature in its development from the beginnings down to the death of Goethe, with special regard to important epochs, notable literary monuments, and underlying intellectual movements. Vogt and Koch, *Geschichte der deutschen Literatur*

von den ältesten Zeiten bis zur Gegenwart. Francke, Social Forces in German Literature. Advanced course open to undergraduates and graduates. II. Modern Period.—*Three hours a week, second semester.*

### German Romanticism.

Lectures and assigned readings. The beginnings of German Romanticism. Influence of Kant, Fichte, and Schelling upon the Romantic movement. Its relation to German Classicism and to the social and political life of the times. The younger Romantic movement. The period of the wars of liberation. The intellectual movement leading to the revolution of 1848. Advanced course open to undergraduates and graduates.—*Two hours a week, throughout the year.*

### Proseminary in Modern German Literature.

The Storm and Stress Movement. Study of the sources, and the social and literary conditions of Germany, that gave rise to the movement. Reports, discussions, and lectures. Primarily for graduates.—*Two hours a week, first semester.*

### [Proseminary in Goethe's Faust.

Primarily for graduates. Omitted in 1901-1902, to be given in 1902-1903.].

### Heinrich Heine.

A comprehensive study of his life and works. Lectures and reports on assigned topics. Advanced course open to graduates and undergraduates.—*Two hours a week, second semester.*

### Teachers' Course.

Lectures and discussions. Open to graduates and undergraduates.—*Three hours a week, second semester.*

Assistant Professor MENSEL:—

### History of German Literature.

Period I. From the earliest time to the end of the Middle Ages.—*Two hours a week, first semester.*

### Middle High German.

Lectures and recitations with assigned readings. This course is intended to serve as an introduction to Middle High German; incidentally it includes a brief sketch of the historical development of Modern German phonology and inflection. The selections read are drawn from homiletic prose, folk-epic, court-epic, and lyric; and in the translation of these into Modern German special atten-

tion is paid to the principles underlying change in the word-signification. Paul, *Mittelhochdeutsche Grammatik*, 4te Aufl., and Bachmann, *Mittelhochdeutsches Lesebuch*. Advanced course open to undergraduates and graduates.—*Three hours a week, first semester.*

### The Middle High German Folk-Epic.

Lectures with collateral readings on the characteristic features, composition, legendary setting, language, and metre of the folk-epic. Reading and interpretation of selections from the *Nibelungenlied*, *Gudrun*, and minor epics. Reports on assigned topics. Advanced course open to undergraduates and graduates.—*Two hours a week, second semester.*

### Introductory Course in Old High German:—

Lectures based upon Braune's *Abriss der althochdeutschen Lautlehre*, 2te Aufl., and readings from Braune's *Althochdeutsches Lesebuch*, 4te Aufl. The course will include a review of the history of the literature of the period. Primarily for graduates.—*Two hours a week, second semester.*

### [Proseminary in Middle High German.

Special studies in Hartmann von Aue. Primarily for graduates.—*Two hours a week, second semester.*

### Proseminary in Old High German.

Special studies in the style of Isidor and the Monsee Fragments. Omitted in 1901-1902; to be given in 1902-1903.]

### Dr. DIEKHOF:—

#### German Syntax.

Lectures and reports on assigned topics. Wunderlich, *Der deutsche Satzbau*, and Erdmann-Mensing, *Grundzüge der deutschen Syntax*. Advanced course open to undergraduates and graduates.—*Three hours a week, second semester.*

#### Old Saxon.

Lectures and recitations. Holthausen, *Altsächsisches Elementarbuch*, and Behaghel, *Heliand*.—*Two hours a week, throughout the year.*

### Dr. HILDNER:—

#### Hans Sachs.

Lectures and reports.—*Two hours a week, second semester.*

### Dr. FLORER:—

#### Life and Works of Luther.

Lectures and reports. Special attention is paid to Luther's language. Advanced course open to undergraduates and graduates.—*Two hours a week, second semester.*

Dr. BOUCKE:—

### The History of German Civilization.

Lectures and readings from Gustav Freytag's *Bilder aus der deutschen Vergangenheit*. This course is intended to supplement the course on German literature, and to give a survey of the historical development of German culture in its various expressions, up to the beginning of this century, with special regard to the more important epochs. Advanced course open to undergraduates and graduates.—*Two hours a week, throughout the year.*

Dr. CARRINGTON:—

### German Mythology.

Lectures and reports on assigned topics. Klee's *Deutsche Mythologie*. Advanced course open to undergraduates and graduates.—*Two hours a week, second semester.*

### Gothic.

Assistant Professor MENSEL:—

### Introductory Course.

Lectures on phonology and morphology, and reading of the Gospels. Streitberg's *Gotisches Elementarbuch*. This course serves as an introduction to the study of Germanic Philology. Primarily for graduates.—*Two hours a week, first semester.*

### Advanced Course.

The Epistles. Heyne's *Ulphilas*, 9te Aufl. Primarily for graduates.—*Two hours a week, second semester.*

### Scandinavian.

Dr. BOUCKE:—

### Old Icelandic.

Introductory course. Lectures and reading of selections from the Sagas. Kahle's *Altisländisches Elementarbuch*. Primarily for graduates.—*Two hours a week throughout the year.*

### English Philology and General Linguistics.

The work of this department is concerned with the study of (1) the mother tongue, (2) the life and growth of language in general, and (3) the teaching of language.

Professor HEMPL:—

**Old English.\***

A general introduction to the subject.—*Four hours a week, first semester.*

**Old-English Phonology and Morphology.**

This course consists of lectures on the history of Old-English sounds and forms, together with the private reading of Old-English prose texts and the investigation of two or three problems.—*Two hours a week, second semester.*

**[Old-English Poetry.**

It is the object of this course to make the student familiar with the most important poetical literature of the Old-English period.—*Two hours a week, second semester. Omitted in 1901–1902.]*

**Middle English.**

This course consists of a brief introduction to the subject, the private reading of several of Chaucer's works, and the study of some of the more important questions of Chaucer's workmanship.—*Two hours a week, first semester.*

**The History of the English Language.**

Lectures on the most important factors in the history of the language, together with the investigation of the cause and process of certain changes in usage.—*Two hours a week, first semester.*

**Modern-English Grammar.**

This course is intended specially for candidates preparing to teach English.—*Two hours a week, second semester.*

**The Elements of Phonetics.**

A study of the elements of speech-sounds, with special reference to the needs of candidates preparing to teach modern languages.—*Two hours a week, first semester.*

**The Teaching of Modern Foreign Languages.**

It is the object in this course to give practical instruction in the teaching of modern foreign languages, as well as advice in the matter of preparation for teaching. There will also be given a brief survey of the most important methods now employed.—*Two hours a week, second semester.*

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\*The term "Old English" is used in this Announcement for the period of English, often called "Anglo-Saxon."

### The Principles of Linguistic Science.

Lectures on the most important phases of the life and growth of language. It is the object in this course to furnish to students of either classical or modern languages an explanation of the phenomena of the languages they are studying, and to bring these scattered data into connection with the underlying principles.—*Two hours a week, second semester.*

### English and Rhetoric.

The advanced work of this department proceeds along two main lines: English and American Literature, and Rhetoric. Advanced courses in Oratory are also offered in connection with this department.

The following courses (open also to undergraduates who are prepared to take them) will ordinarily be found adapted to the needs of graduate students. In case of students who have specialized in English for their first degree, additional advanced courses for graduate study are provided after conference with the candidate. Some of the courses given in recent years are the following: The Development of the English Novel; The English Satirists of the Seventeenth and Eighteenth Centuries; The Romantic Revival in England at the close of the last century; The Pre-Shakespearian Drama in England; Shakespeare's Histories.

See also the courses in English Philology and General Linguistics on pages 27 and 28.

Professor DEMMON:—

### English Literature Seminary.

Each student is expected, first, to present two papers during the semester, one an essay upon an assigned masterpiece, the other a critique of a fellow-student's essay; second, to participate each week in a general *ex tempore* discussion of the work under consideration; third, to read the entire list of works with which the course deals, together with such critical literature on each subject as there may be time for. The aim of the course is to lay a foundation for correctly estimating literary masterpieces of widely varying types. The list of masterpieces is as follows: More's Utopia; Bacon's Essays; Milton's Areopagitica; Carlyle's Sartor Resartus; George Eliot's Silas Marner; Spenser's Faery Queen, Book I; Shakespeare's Sonnets; Milton's Paradise Lost; Dryden's Absalom and Achitophel; Pope's Essay on Man; Wordsworth's Excursion; Browning's Soul Tragedy; Tennyson's Maud; Swinburne's Atalanta in Calydon.—*First semester.*

### Shakespeare Seminary.

The method is similar to that in the preceding course. The plays selected are: *A Midsummer Night's Dream*; *The Merchant of Venice*; *As You Like It*; *Twelfth Night*; *The Tempest*; *Richard III*; the two parts of *Henry IV*; *Romeo and Juliet*; *Hamlet*; *Othello*; *King Lear*; *Macbeth*; *Coriolanus*.—*Second semester*.

### American Literature Seminary.

Authors studied: Irving, Cooper, Bryant, Emerson, Hawthorne, Longfellow, Whittier, Poe, Holmes, Thoreau, Lowell, Bayard Taylor, Howells, and James. Representative works of the authors named are studied, and an attempt is made to discover the distinctly American element by a comparative study with British authors.—*Second semester*. When this subject is taken for an advanced degree, individual work is assigned for the first semester, upon which the candidate is expected to make weekly reports.

### Principles of Criticism.

Lectures. Candidates who take their major in English Literature are expected to take this course in connection with the seminary work in English Literature and Shakespeare.—*Throughout the year*.

### Studies in the text of Shakespeare.

The aim will be to illustrate the methods of textual study as applied to a play like *Hamlet*, and the difficulties to be overcome in establishing a text. The McMillan Shakespeare Library affords a very full apparatus for these studies.—*Two hours a week, first semester*.

### Professor SCOTT:—

#### Development of Rhetorical Theory.

A historical and comparative study of the growth of rhetorical theory from Aristotle to the present time.—*First semester*.

#### Principles of Style.

Inductive study of masterpieces of English prose, with a view to verifying rhetorical principles. Lectures, readings, discussions.—*Second semester*.

#### Teachers' Course.

Methods of teaching English Composition and Rhetoric.—*Second semester*.



The course includes (1) a discussion of the principles — æsthetic, psychological and sociological — which underlie the most notable theories of rhetoric and composition; (2) an application of these principles to certain urgent problems in the teaching of English; (3) practical suggestions with reference to the planning and management of composition work in secondary schools; (4) a critical examination of recent text-books.

Professor TRUEBLOOD: —

Study of Great Orators, ancient and modern.

Lectures on methods of public address and source of power. Study of representative selections. The method is similar to that in the English Literature Seminary.— *Throughout the year.*

Oral Discussions.

This course is designed to develop readiness of extemporization. It involves the application of the principles of formal logic and elocution in the discussion of leading topics of the day. Students are required to present briefs of the subjects discussed.—*Throughout the year.*

#### Music.

Courses are given in the University, but not here enumerated, that provide instruction in the science and practice of choral music, the science of harmony, and simple and double counterpoint. The courses named below are intended for graduate students.

Professor STANLEY: —

Canon and Fugue.

*Two hours a week, throughout the year.*

Musical Form.

*Two hours a week, throughout the year.*

Free Composition.

*Two hours a week, throughout the year.*

Instrumentation.

*Two hours a week, throughout the year.*

Original work in research will be required of candidates for a doctor's degree, who take music as one of their subjects.

#### History.

The graduate work described below presupposes such information and training as is represented by undergraduate Courses 1, 2, and 3,

as described in the University Calendar for 1900-1901, pages 80 to 83, supplemented by one or more advanced undergraduate courses. In indicating the courses named below as adapted to the needs of graduate students it is not intended to exclude other advanced undergraduate courses, especially those in English constitutional history, in mediæval history, and in American colonial history, which, in certain cases, graduate students will be asked to take.

A large part of the work of the graduate student will consist of individual research and investigation carried on under the personal supervision of the professor in charge. To insure such supervision, two seminaries have been organized primarily for graduates. The work of these seminaries has been so arranged that the same student may remain a member of the seminary for two or more years. In the library building are seminary rooms in which graduate students may carry on their work. In these rooms is shelved the Hagerman collection of books on history and political science, including many works to which the student has frequent occasion to refer. As occasion requires, books in special lines are placed in the seminary rooms for the use of advanced students, and everything is done to make the library serve the purpose of research.

Professor HUDSON:—

The History of Europe since the Treaty of Westphalia.

This period is covered by two courses, each three hours a week. The course given the first semester comes down to the close of the French Revolution, and is followed the second semester by a course dealing with the history of Europe since the Peace of Vienna.

Present Problems of European Politics.

In a course given the first semester, three hours a week, a study is made of the relations of the Powers as they are affected by Asiatic and African questions and by the decline of the Ottoman Empire. Research courses are also given in the same field, each two hours a week, the course of the first semester dealing with the history of the relations of China with the Western Powers, while in that of the Second Semester a study is made of the decline of the Ottoman Empire and the problems which it involves.

Political Institutions.

A course given the second semester, three hours a week, deals with the political institutions of England, France, Germany, and Switzerland.

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Professor McLAUGHLIN: —

**The Political and Constitutional History of the United States, 1776–1861.**

The purpose of this course is the careful study of the origin of the Constitution, its interpretation in history, the development of our political system, and the growth and tendencies of political parties. The work is based upon lectures and the careful examination of prescribed texts. The student is expected also to read in the library and to form a wide acquaintance with the secondary, and with some of the primary, authorities. Weekly reports on the reading are required. Those who have not had a thorough course in colonial history will find it desirable to take undergraduate Course 13 (University Calendar for 1900–1901, page 82) in connection with this course.— *Three times a week, throughout the year.*

**Seminary in American History.**

The aim of the seminary is to guide and direct the student in the use of primary authorities and to give instruction in methods of research. Special subjects of investigation are assigned to members of the seminary, and regular reports are made. Students at work upon theses are expected to report difficulties and successes, and are guided in their work. During a portion of the year the more important constitutional questions of the rebellion and the period of reconstruction are discussed, and there is an examination of the leading documents of this period.— *Two hours a week, throughout the year.*

**Constitutional Law and Political Institutions of the United States.**

In this course there is a consideration of the Constitution as it has been interpreted by the courts, and a study of the political system as it appears in action. Graduate students electing this work are expected to read important texts, to examine leading cases, and to report on problems in politics and administration.— *Three times a week, for one semester.*

In addition to following the three courses just described, graduate students meet periodically to make reports on current literature, to discuss new books, and to examine important political questions or decisions of the courts.

Assistant Professor Dow:—

Studies in the History of France in Mediæval and Early Modern Periods.

In the *first semester* this course deals chiefly with institutions in France during the feudal period. In the *second semester* special attention is given to changes which took place in the later mediæval and early modern periods.—*Three hours a week.*

Dr. CROSS:—

English History.

An advanced course in English Constitutional History is given in each semester. The course in the *first semester* deals with the period preceding the reign of Edward I, and is based mainly on Stubb's Select Charters. In the *second semester* the course deals with the constitutional aspects of the Puritan Revolution, and is based on Gardiner's Constitutional Documents.—*Two hours a week.*

Assistant Professor FAIRLIE:—

American Administrative Law.

This course will cover the principles and machinery of national, state, and local administration, including the administrative duties of the President, the federal administrative departments, state governors, the various state administrative bureaus, and local government of counties, towns, and cities, with a study of methods of nomination and election and the influence of political parties on the administration. *Three hours a week, first semester.*

Administrative Law of European Countries.

This course continues the course in American Administrative Law by a study of the administrative systems—central and local—of England, France, and Germany, with some reference to Italy, Spain, and other countries. The general principles of the different systems will be emphasized, particularly the systems of administrative control of local authorities; and some attention will be given to particular branches of administration. *Three hours a week, second semester.*

Municipal Administration.

During the first semester this course deals with the history of municipal development and municipal activities; in the second semester with municipal organization, control, and politics. The his-

torical part treats briefly of ancient and mediæval cities, and at somewhat greater length, of English, American, and nineteenth century development. In the second part particular municipal activities are discussed, such as Police, Fire Brigades, Health Departments, Public Works, Schools, Charities, municipal lighting, street railways, etc.; in each field there is a study of development, of present conditions and methods of administration in the principal cities of America and Europe, and a discussion of disputed problems. The problems of organization include municipal councils, the administrative officials, and the mayor. This is followed by a study of the various methods of legislative, judicial, and administrative control of municipal officials, including the special legal writs used for this purpose in England and America. The last division examines political methods of party "machines" and "reform" organizations, recent primary legislation, and the relation of politics to municipal administration. *Three hours a week, throughout the year.*

### Seminary in Public Administration.

This is a course for special research on special topics. These will be adapted to the interest of the students; and may be in federal, state, local, or municipal administration.

### Michigan Government.

This course presents a systematic study of state and local government in Michigan. Among the particular topics are: the state constitutions, the governor, the legislature, state administrative officers, the judicial system, statutes under the police power, town and county government, and the government of cities. *Two hours a week, first semester.*

### Philosophy.

The advanced courses described below and marked with an asterisk (\*) presuppose instruction in logic, ethics, and general psychology; also a general introduction to philosophy, and a somewhat extended study of the history of philosophy, ancient, mediæval and modern. Candidates for a higher degree who have not had a preparation equivalent to this are expected to take certain of the lower courses, either before entering upon, or in connection with, their graduate work. Advanced courses bearing upon the history of philosophy are also given in the departments of Greek, Latin, French, and German. The courses in mathematics are strongly recommended for students specializing in philosophy.

## A. HISTORY OF PHILOSOPHY.

Professor WENLEY:—

\*The Philosophy of Kant.

Proseminary; study of the Critique of Pure Reason.—*Two hours a week, first semester.*

\*The Philosophy of Hegel.

Study of the Logic and discussions.—*Two hours a week, second semester.*

Professor LLOYD:—

The History of Philosophy.

A general outline of the subject from Thales to the present century. The course is designed to state the development of philosophical problems and concepts, and thus to give the student his bearings in philosophy. It is therefore highly advisable, if this course has not been taken before beginning graduate work, that it be taken at once upon beginning it.—*Three hours a week, throughout the year.*

\*Philosophy since Hegel.

The object of this course is to introduce the student to the methods of investigation and discussion in the subject. Lectures; detailed study of Lotze, the Pessimists, etc.—*Two hours a week, second semester.*

Philosophy of History.

Lectures and study of special periods.—*Two hours a week, first semester.*

Assistant Professor REBEC:—

Philosophy in America.

Lectures, and reading of Edwards, the Transcendentalists, etc.—*Two hours a week, first semester.*

\*Plato's Republic.

Collateral reading and theses.—*Two hours a week, first semester.*

## B. ETHICS.

Professor LLOYD:—

Metaphysic of Ethics.

Lectures on the metaphysical implications of ethical theory.—*Two hours a week, second semester.*

**Systematic Ethics.**

Lectures on ethical theory. Application of psychology to a theory of conduct.—*Two hours a week, second semester.* These courses alternate.

Assistant Professor REBEC:—

**\*Aristotle's Ethics.**

Collateral reading and theses.—*Two hours a week, second semester.*

**C. PSYCHOLOGY.**

The Psychological Laboratory is well equipped for original investigation.

Assistant Professor PILLSBURY and Dr. SLAUGHTER:—

**Beginners' Course in Experimental Psychology.**

*Three hours a week, each semester.*

**Second Course in Experimental Psychology.**

*Three hours a week, second semester.*

**\*Research Course in Experimental Psychology.**

*Six hours a week, throughout the year.*

**Genetic Psychology.**

*Two hours a week, first semester.*

**D. SPECIAL COURSES.**

Professor WENLEY:—

**\*Movements of Thought in the Nineteenth Century.**

A study of the metaphysical implications of modern thought. Lectures, reading, thesis.—*Two hours a week, second semester.*

**Philosophy of Religion.**

*Two hours a week, first semester.*

Professor LLOYD:—

**British and American Political Ideas.**

Lectures, reading, reports.—*Two hours a week, first semester.*

**Political Philosophy.**

A critical study of society, of sovereignty, rights, duty, and of the idea of the social organism.—*Two hours a week, second semester.*

Assistant Professor REBEC:—

**Æsthetics.**

A historical review of leading theories and their connection with philosophical systems. Bosanquet's *History of Æsthetics* will serve as a basis of study.— *Two hours a week, first semester.*

#### E. GRADUATE SEMINARY.

The library of George S. Morris, late Professor of Philosophy in the University has been given to the Philosophical Department. It contains about 1,100 volumes, covering the entire field of philosophical inquiry. They have been removed to the Morris Seminary Room, and are reserved for the exclusive use of graduates and special students in Philosophy.

Professors WENLEY and LLOYD, Assistant Professors REBEC and PILLSBURY, and Dr. SLAUGHTER:—

#### Graduate Seminary.

The assignment of subjects is as follows: Professor WENLEY, Metaphysics, Ethics, Philosophy of Religion, and Ancient Philosophy; Professor LLOYD, History of Philosophy, Metaphysics, and Ethics; Assistant Professor REBEC, Logic, Æsthetics, and Ancient Philosophy; Assistant Professor PILLSBURY, General and Experimental Psychology; Dr. SLAUGHTER, General and Experimental Psychology and Epistemology.

#### The Science and the Art of Teaching.

The objects sought in this department, as they are defined in the Calendar of the University for 1900-1901, are partly practical and partly scientific. The one end is gained in preparing teachers professionally for teaching, the other, in promoting the study of teaching as a division of human knowledge. In the Graduate School more stress is laid upon the scientific phase of the subject than in undergraduate work.

Qualifications for admission to graduate work may be dealt with under two heads.

1. General Education.— When teaching is studied as science, art, or history, it becomes reflective; that is, it takes account of its own principles, methods, and development. Manifestly, a student can not pursue pedagogical studies with profit unless he has an education broad enough to furnish him with a basis upon which to build. More than this, the fundamental ideas of teaching as a study are furnished by other studies. Pedagogy is a mixed science, having its presuppositions in other sciences. While a student who has taken any one of the purely literary degrees given by the University should be able to carry on this subject with advantage, the best work calls for an



elementary acquaintance, at least, with physiology, psychology, logic, ethics, and æsthetics, for these are the sciences in which the pre-suppositions of pedagogy are found.

2. **Special Preparation.**—In this respect the department differs somewhat from most others. It can not, under existing conditions, require previous study of the science, art, or history of education, because teaching, in only rare instances, is a subject of undergraduate instruction. Some candidates for the Graduate School have had such training, others have not. It is desirable that all who intend to pursue the subject in the School should have given some attention to it. A practical acquaintance with teaching as a teacher, principal, or supervisor is helpful; and so is a general knowledge of education and teaching derived from observation and reading current literature or standard works. It is desirable also that graduate students shall not find it necessary to take the most elementary work given in the department.

In respect to courses a few words must suffice. The theoretical and historical courses, and the courses in school supervision and in the comparative study of school systems, all are suitable for graduate students. If the courses as ordinarily pursued are not found adequate, they are re-enforced by outside reading. No graduate courses, so-called, are offered. Students who have taken courses in normal schools, or even in colleges, bearing the same names as those laid down in Announcement and Calendar need have no fear of finding work they have already done merely duplicated. These courses are more extensive and thorough. For example, Compayré's *History of Pedagogy* is prescribed as a text-book, but is prescribed mainly to mark out, in a general way, a field that is cultivated much more broadly and deeply than it is cultivated by the author of the book.

#### FIRST SEMESTER.

1. **Practical Pedagogy.** The arts of teaching and governing; methods of instruction and general school-room practice; school hygiene; school law. Lectures with reading. Fitch's *Lectures on Teaching*. *Four hours*. Professor PAYNE.
3. **History of Education, Ancient and Mediæval.** Recitations and lectures. Text-book: Compayré's *History of Pedagogy*. The subjects treated in the lectures are Oriental, Greek, and Roman education, and the rise and early development of Christian schools. *Three hours*. Professor PAYNE.
5. **School Supervision.** General school management, the art of grading and arranging courses of study, the conduct of insti-

- tutes, etc. Recitations and lectures. Text-book: Payne's Chapters on School Supervision. *Three hours.* Professor WHITNEY.
6. The Comparative Study of Educational Systems, Domestic and Foreign. Lectures and reading. *Two hours.* Professor WHITNEY.
9. Child Study. Historical sketch; a discussion of the factors which influence intellectual development; methods of child study; physiology and psychology of childhood; study of special problems, such as the education of the nervous system, the hygiene of studies, motor ability, temperament, period of adolescence, children's drawings, interests, literature, fears, angers, lies, etc. The aim throughout is to treat each topic from a distinctly practical pedagogical point of view. Recitations and lectures. Text-book: Taylor's A Study of the Child. *Two hours.* Professor WHITNEY.
10. Social Phases of Education. A consideration of the school as a social factor in its relations to the child, to the home, to the church, and to the state; also a discussion of the relation of education to vocation and to crime. Lectures and recitations. Text-book: Dutton's Social Phases of Education. *Two hours.* Professor WHITNEY.

#### SECOND SEMESTER.

2. Theoretical and Critical Pedagogy. The principles underlying the arts of teaching and governing. Lectures and readings. Hinsdale's Studies in Education. *Four hours.* Professor PAYNE.
4. History of Modern Education. Recitations and lectures. Text-book: Compayré's History of Pedagogy. The topics dealt with in the lectures are the movements of modern educational thought and practice. *Three hours.* Professor PAYNE.
- [7. History of Education in the United States. The course deals with the salient features of the subject, from the earliest time, but particular attention is paid to the state of education in the colonies, and to the common school revival in the first half of the present century. The recent university development is also described. Lectures and reading. Hinsdale's Horace Mann and the Common School Revival in the United States and Documents Illustrative of American Educational History are subjects of examination. *One hour.* Professor PAYNE.

Course 7 is omitted in 1901-1902, but may be expected in 1902-1903.]

### Political Economy and Sociology.

The strictly undergraduate courses in political economy represent the work of at least one academic year. These courses cover "Elements of Political Economy" and "Problems in Political Economy [not given in 1901-1902] or Social and Industrial Reform." For description see the University Calendar.

The courses enumerated below are, with two or three exceptions, open to undergraduate as well as graduate students, but special instruction will be afforded all graduate students in connection with these courses, this special instruction being devoted to a more careful analysis and a more extended discussion than is possible in the lectures. The courses designated as "Graduate Courses" are open only to graduate students, or to undergraduates making a specialty of political economy in their senior year.

Professor ADAMS:—

#### History of the Development of Industrial Society.

This course embraces a history of English industrial society from the twelfth century to the present time, and is designed to show how modern industrial customs and rights came into existence. It should be preceded by a course in English History.—

*Three hours a week, second semester.*

#### [Transportation Problems.

This course considers the social and industrial significance of modern transportation, traces the development of railway transportation in this country and in the more important European countries, discusses the administrative and legislative organization of railway systems, studies the history of railway problems in the United States, and pays special attention to the experiment of controlling railways through commissions. Not given in 1901-1902.—*Two hours a week, second semester.]*

#### Administration of Corporate and Public Industries.

This course undertakes an analysis of industrial organization primarily from the administrative point of view. It considers the history and social significance of rapid transit in cities, and of other quasi-public industries. It studies railway administration under public as well as private ownership, and makes a special investigation into the history, organization, and administration of the Post-office Department of this and other countries. Alternates with the preceding course.—*Two hours a week, second semester.*

### Seminary in Political Economy.

It is the purpose of instruction by the seminary method to familiarize the student with independent investigation. It is not possible to advertise the topics studied until after consultation with the students who elect the course; but in lieu of this may be submitted a description of the work during the past academic year.

**First Semester.**—The subjects chosen for investigation were as follows: state taxation of railroads; state railway commissions; financial reform of the Postal Service; Rodbertus theory of crises; the scope of economic geography; and the economics of agriculture.

**Second Semester.**—The general theme selected for investigation was the development and control of quasi-public industries. It involved a study of the gas industry, the electric-lighting industry, the street-railway industry, public water works, administration of the post-office, railway consolidation and expense accounts.

Professor TAYLOR:—

### Principles of the Science of Finance.

Under this title will be presented a discussion of principles of public expenditure, public revenue, budgetary legislation, financial administration, public industries, and public debts.—*Two hours a week, second semester.*

### Theory and History of Money.

The first half of the semester will be occupied with the somewhat detailed discussion of special topics, such as the Value of Money, the Ideal Standard, etc. The second half will be given to Monetary History, particularly in the United States.—*Two hours a week, first semester.*

### Theory and History of Banking.

Like the preceding, this course is roughly divided into two parts devoted respectively to theory and history. Among the topics considered will be the Nature and Social Functions of Banking, the Natural Laws of Banking Phenomena, the Different Systems of Regulation, etc.—*Two hours a week, second semester.*

### Economic Theory down to John Stuart Mill.

Ingram's History of Political Economy forms the basis of this course; but much of the time will be given to the study of masterpieces. This and the following course will be given in alternate years.—*Two hours a week, second semester.*

[Economic Theory from John Stuart Mill down.

As with the former course the student will make use of Ingram, but the shorter period covered will permit a larger use of outside literature and a fuller study of special schools. Omitted in 1901-1902.—*Two hours a week, second semester.*]

### Seminary in Economic Theory.

The time is devoted to a re-examination of some leading problems of Economic Theory, including the Nature of Capital, the Origin of Interest and Rent, the Significance of the Austrian School, Recent Theories of Distribution, etc.

*Commerce and Industry.*—In addition to the courses named above, four new courses of instruction will be offered in connection with the course in Higher Commercial Education, upon Economic Geography and the Analysis of Industrial Development in the United States; but it is not possible at the date of this Announcement to give a detailed description of these courses. A course in the Science of Accounts will also be arranged.

Assistant Professor COOLEY:—

### The Theory and Practice of Statistics.

This course treats statistics as a method of social research, an instrument important not only to economists and statisticians, but also to all who wish to qualify themselves to understand or criticise current social and political discussion. The class read Mayo-Smith's *Statistics and Sociology*, and, in addition, each member is assigned an exercise intended to afford some practice in collating statistical material and presenting it in tabular and graphical form. Advanced students only are admitted.—*One hour a week, first semester.*

### Principles of Sociology.

This course aims at a systematic and comprehensive study of the underlying principles of social science. The general plan followed is to begin with personal relations in their simplest and most direct form; proceeding thence to the more complex forms of association, to an analysis of the processes of social change and, finally, to a study of social tendency and the theory of progress. Historical references are freely used, but the main aim is a rational interpretation of existing society, and ample contemporary illustration is given of the principles advanced. While some attention is paid to the differing views of prominent writers, the course is, in the main, constructive rather than critical.—*Four hours a week, first semester.*

### Problems in Sociology.

This course embraces a study of the laws of population, degeneracy, the liquor problem, poor-relief (public and private), vagrancy, crime and penology, the divorce problem and kindred questions, the assimilation of the foreign element in American population, the development of cities, the tenement question, slums, social settlements, and other sociological questions of present interest.

The class is supplied with a list of about twenty-five topics, accompanied by references, and each student is required to choose one of these topics and write an essay upon it.— *Four hours a week, second semester.*

### Historical Development of Sociological Thought; Study of Comte, Spencer, Ward, Giddings, and Others.

This course is intended to furnish an opportunity for comparative study and discussion of the writers who have contributed most to the growth of sociology. The class consists chiefly of graduate students, and is conducted somewhat as a seminary.— *Two hours a week, first semester.*

### Psychological Sociology.

This course is similar in character to Course 21, and usually, though not necessarily, succeeds it. The views of Baldwin, Giddings, Tarde, Durkheim, and others are carefully studied, but, as in other courses, it is endeavored to make this study constructive rather than merely critical.— *Two hours a week, second semester.*

### Special Work with Graduate Students.

Graduate students sufficiently advanced in their work to need special guidance,— especially those working for the doctor's degree, — will be met in small groups or singly, as often as is found practicable and expedient.

### International Law.

The courses in international law presuppose a general acquaintance with modern European history.

President ANGELL: —

#### Lectures on International Law.

*Two hours a week, first semester.*

#### History of Treaties.

*Two hours a week, second semester.*

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**Mathematics.**

The courses mentioned below presuppose the usual preparatory course in algebra and elementary geometry, plane, solid, and spherical, together with two years of collegiate study devoted to trigonometry, higher algebra, plane analytic geometry, and differential and integral calculus.

In addition to the courses announced below, advanced work in mathematical reading and research will be arranged, so far as possible, to suit the needs of individual students.

**A. FOR UNDERGRADUATES AND GRADUATES.**

Professor BEMAN:—

**Solid Analytic Geometry.**

Frost, with references to Salmon.—*Two hours a week, first semester.*

**Differential Equations.**

Johnson, with references to Forsyth, Boole, and Mansion.—*Three hours a week, first semester.*

**Teachers' Seminary.**

Critical study of certain text-books in algebra and geometry, together with the discussion of methods and aims in mathematical teaching, sketches of the history of mathematics, lists of books for teachers, etc.—*Two hours a week, throughout the year.*

Professor ZIWET:—

**Advanced Mechanics.**

This course forms a direct continuation of the course in elementary mechanics; it is mainly devoted to the dynamics of a rigid body.—*Three hours a week, second semester.*

Assistant Professor MARKLEY:—

**Projective Geometry and Modern Analytic Geometry.**

*Three hours a week, throughout the year.*

Dr. GLOVER:—

**Higher Algebra.**

The more important topics to be considered in this course are: symmetric functions of the roots; resultants; solution of a system of  $n$  linear equations; theorems concerning integral functions of one and two variables; correspondence; linear transformation; invariants and covariants; symbolic forms.—*Three hours a week, throughout the year.*

## B. PRIMARILY FOR GRADUATES.

Professor BEMAN:—

Advanced, Differential, and Integral Calculus.

Jordan's Cours d'analyse.—*Two hours a week, throughout the year.*

Higher Plane Curves.

Salmon, with references to Clebsch.—*Two hours a week, second semester.*

Linear Differential Equations.

*Two hours a week, second semester.*

Professor ZIWET:—

Theory of the Potential.

*Two hours a week, first semester.*

Partial Differential Equations.

This course, which presupposes an elementary knowledge of ordinary differential equations and projective geometry, is devoted mainly to partial differential equations of the first order and their application in geometry and mathematical physics.—*Two hours a week, throughout the year.*

Calculus of Variations and Differential Geometry.

*Two hours a week, throughout the year.*

Assistant Professor MARKLEY:—

Theory of Functions.

The first part of this course is devoted to functions of real variables; the second part to functions of a complex variable. It aims to present the fundamental ideas of complex quantities, their geometrical representation and their calculus, and to furnish an introduction to the theories of functions of a complex variable as developed by Cauchy, Riemann, and Weierstrass.—*Three hours a week, throughout the year.*

Theory of Numbers.

*Two hours a week, throughout the year.*

### Physics.

The courses announced below presuppose about one and a half years' collegiate work in physics; viz., a course in mechanics, sound, light, electricity, magnetism, and heat, five hours a week, for one



year; a beginners' course in laboratory work, two or three hours a week for half a year; and a course in primary and secondary batteries, two hours a week for half a year.

The courses in Mathematical Electricity, the Theory of Light, the Theory of Heat, and the Advanced Laboratory Courses in Sound and Light are primarily for graduates; the other courses are open to undergraduates, but they are found to be beyond the work done in many colleges.

Graduate students, who are properly qualified by their previous training, have opportunity for original research in the physical laboratory under the immediate supervision of the director and his associates.

Professor CARHART:—

Dynamo-Electric Machinery.

*Three hours a week, second semester.*

Alternate Current Apparatus.

*Three hours a week, first semester.*

Alternate Current Phenomena.

*Two hours a week, second semester.*

These three courses form a graded series covering the theory of dynamo-electric machines, alternate current working, transformers, and alternate current phenomena as applied to generators, distribution of power, and induction motors. Laboratory work forms a part of the first two courses.

The Theory of Heat: Preston.

This course covers most of the text, including the chapters on thermodynamics.—*Two hours a week, first semester.*

Professor PATTERSON:—

Mathematical Electricity.

This course is a treatment of the subject with the use of higher mathematics. Special attention is given to the Newtonian potential function, polarized distributions, electrostatics, electrokinetics, electromagnetism, and electromagnetic waves.—*Three hours a week, first semester; two hours a week, second semester.*

Electrical Measurements.

This course comprises, in addition to all the refined methods of measuring resistance, current, and electromotive force, a very thorough treatment of the subjects of capacity, inductance, and mag-

netism.— Lectures, *one hour a week, throughout the year*; laboratory work, *two or three times a week, first semester*; *twice a week, second semester*.

Professor REED:— .

### The Theory of Sound.

Lectures and laboratory work. The lectures are based upon the works of Helmholtz and Rayleigh. The laboratory work involves acoustical and optical measurements of period, amplitude, and phase-difference of simple and compound vibrating systems; also the study of sensitive flames, organ pipes, resonators, and the application of stroboscopic methods to oscillating systems.— Lectures, *twice a week*; laboratory work, *twice a week, first semester*.

### The Theory of Light: Preston.

The work involves a careful study of the text, with supplementary reading. The laboratory work includes measurements with the focometer, spectrometer, polarimeter, and interferometer; determination of wave-lengths by diffraction and interference methods; and a study of arc and solar spectra.— Lectures and recitations, *two hours a week*; laboratory work, *twice a week, second semester*.

### Advanced Laboratory Work in Sound.

The work is devoted to a repetition of the classical experiments of Mach, Boltzmann, and Helmholtz: to the study of special problems, and to the application of optical methods to acoustical measurements.— *Twice a week, first semester*.

Assistant Professor GUTHE:—

### Laboratory Work in Heat.

This course comprises determinations of specific heat of solids and liquids; heat of fusion and of vaporization; the coefficient of expansion of solids, liquids, and gases; also experiments on the constants of gases and vapors, such as the specific heat of gases, vapor density, vapor pressure, etc.; also the determination of the mechanical equivalent of heat by electrical methods.— *Twice a week, first semester*.

### Theories of Solutions and of Electrolytes.

The work includes the osmotic theory of the voltaic cell, electrolytic resistance, and the internal resistance of primary batteries. *Three times a week, second semester*.

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### Chemistry.

To be received as a candidate for a higher degree with chemistry as a major subject, the preparation must include the branches of general, analytical, and organic chemistry. The extent of work in these branches must have been equivalent in substance to the following named undergraduate courses in this University (University Calendar for 1900-1901, pages 96 to 98): Course 2 or 5 in general chemistry, and Courses 1 (equivalent to Course 3 in general chemistry together with Course 3a in analytical chemistry), 4, and 10 in analytical and organic chemistry,—making in all about twenty-seven hours of undergraduate credit.\* If chemistry be taken as a minor subject in work registered for a higher degree, preparation must have been made equivalent at least to undergraduate Courses 2 and 5 in general chemistry.

Candidates for a doctor's degree, in addition to the requirements above specified, must have satisfied the committee in charge of their studies as to their fitness to enter upon the higher work. A reading knowledge of German and French is necessary.

Graduate students who are not in work for a degree, and those who are preparing for registration as candidates for higher degrees according to the requirements above stated, will be directed in such chemical studies as they require.

A very complete chemical library, with a full set of journals in demand for research, and with current literature in all branches of chemistry, is provided in the University General Library. A reading room in the Chemical Laboratory furnishes duplicates of the full sets most used, as well as duplicates of the chief compilations.

#### A. GENERAL AND PHYSICAL CHEMISTRY.

Professor FREER:—

##### History of Chemistry.

Lectures and historical reading, covering the history of the science from the beginning to 1860.—*Two hours a week, second semester.*

##### Chemical Literature; Journal Club.

The Journal Club discusses current chemical literature. It is under the direction of Professor FREER, but the professors, instructors, and assistants in the laboratory take part therein. All of the prominent journals are divided among the participants, who

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\* An "hour of credit" implies the satisfactory completion of work equivalent to one exercise a week during one semester.

report on the most interesting topics in rotation.— *One hour to one and one-half hours a week, throughout the year.*

### Laboratory Research.

The work may be either organic or inorganic, and the student is at liberty to select one from a number of topics proposed. The work includes the study of the literature bearing upon the topics. In order to accomplish results the student should have at least five clear half days a week to devote to the work. This statement applies to all research courses.— *Hours arranged with instructor, throughout the year.*

### Dr. BIGELOW: —

#### Physical and Theoretical Chemistry.

This course is intended to cover, in an elementary manner, all of the chief topics of modern theoretical and physical chemistry. It is preliminary to or it should accompany laboratory work. Lectures.— *Three hours a week, first semester.*

#### Physical and Theoretical Chemistry.

Advanced course.— *Two hours a week, second semester.*

#### Laboratory Work in Physical Chemistry.

This course covers, as much as possible, the ground outlined in the lectures. It includes the standard methods of determining molecular weights, the theories of solution, dissociation, etc. It is essential for all who wish to become acquainted with modern chemistry.— *Hours arranged with instructor.*

#### Laboratory Research.

Physical Chemistry.— *Hours arranged with instructor.*

### Mr. HIGLEY: —

#### Laboratory Work in Selected Topics of Inorganic Chemistry, including Inorganic Preparations.

This work is preparatory to research and is also especially intended for teachers.

#### Laboratory Research in Inorganic Chemistry.

*Hours arranged with instructor.*

### Dr. HULETT: —

#### Laboratory Work in Selected Topics of Inorganic Chemistry.

This work is preparatory to research, and also includes a train-

ing in preparing demonstrations proper for use in teaching.—  
*Hours arranged with instructor, throughout the year.*

Laboratory Research, Including Work in the Determination of Atomic Weights.

*Hours arranged with instructor, throughout the year.*

Mr. LICHTY:—

Laboratory Work with the Polariscope and the Spectroscope.

This course includes the theory of the instruments, their practical applications, and the study of stereochemical questions involved.—*Hours arranged with instructor, second semester.*

B. ANALYTICAL CHEMISTRY AND ORGANIC CHEMISTRY.

Professor PRESCOTT:—

Seminary in Recent Research.

Library work upon chosen questions, discussions, and the writing of reviews. A subject is assigned to the student, who reads in the journals by direction, and reports the literature for discussion, preparatory to the writing of his review.—*Two hours a week, throughout the year.*

Lectures on Organic Chemistry.

A beginning course with library studies.—*Five times a week, in either first or second semester.*

Investigation in Organic or in Analytical Chemistry.

Laboratory and library research upon subjects selected, *throughout the year.*

Professor JOHNSON:—

Qualitative Analytical Chemistry.

Following undergraduate Course 1 (University Calendar for 1900-1901, page 98) or its equivalent. Laboratory work and lectures.—*Lectures twice a week, second semester; laboratory work, including electrical methods, hours arranged with instructor.*

Professor CAMPBELL:—

Quantitative Analytical Chemistry.

To follow undergraduate Course 4 (University Calendar for 1900-1901, page 99) or its equivalent. Laboratory work directed by lectures in any of three courses, namely: (1) Advanced quantitative methods in general, (2) the analysis of minerals, (3) iron

and steel analysis, (4) cement materials. Electrolytic methods are much employed and there is a room devoted to their use.— *Hours arranged with instructor, throughout the year.*

Investigation in Analytical Method, Inorganic Structure, and Metallurgical Chemistry.

Laboratory work upon questions related to researches published from this department. Use is made of Le Chatelier's pyrometer, as well as of calorimetric methods in study of heats of formation. Special work is given in micrometallography, as bearing upon the constitution of metals and their alloys.— *Hours arranged with instructor, throughout the year.*

Professor CAMPBELL and Mr. WHITE:—

Technical Methods and Investigations.

Laboratory work as follows: (1) Technical Gas Analysis, (2) Technical Examination of Gold and Silver Ores, (3) The Cement Industry, (4) The investigation of some chosen other subject in chemical industry, whether inorganic or organic.— *Hours arranged with instructors, throughout the year. In (2) the work must begin in first semester.*

Assistant Professor SCHLOTTERBECK:—

Phytochemical Research.

The chemical constitution of alkaloids and other principles of plants of related species grown in the botanical gardens.— *Laboratory work, throughout the year.*

Assistant Professor GOMBERG:—

Lectures on the Benzene Derivatives.

Following undergraduate Course 10 (University Calendar for 1900-1901, p. 98) or its equivalent.— *Four hours a week, second semester.*

Organic Synthesis and Ultimate Analysis.

Laboratory work.— *Hours arranged with instructor, throughout the year.*

Investigation in Organic Chemistry.

Laboratory work upon subjects related to Dr. Gomberg's published researches.— *Hours arranged with instructor, throughout the year.*

Mr. TROWBRIDGE: —

**The Chemistry of Beet Sugar.**

Laboratory work with lectures. The methods of analysis in sugar laboratories, the processes of beet sugar factories, and investigation of these methods and of the several related chemical interests.— *Hours arranged with instructor, with lectures, throughout the year, to begin in the first semester.*

**Analytical Organic Chemistry.**

Laboratory courses with lectures upon the alkaloids, the fats, analysis of foods, and special subjects.— *Hours arranged with instructor, throughout the year; the lectures in the second semester.*

Mr. WHITE: —

**Chemical Technology.**

Lectures on the main chemical industries, inorganic in the first semester, and organic in the second semester. Among the subjects treated are the alkali and acid industries, cements, wood and coal distillations, beet sugar, starch, glucose, paper, bleaching, dyeing, and tanning.— *Five hours a week, throughout the year, with accompanying laboratory work.*

Dr. SULLIVAN: —

**Investigation of Inorganic Reactions.**

Laboratory and library research. The application of the methods of physical chemistry to analytical investigation. Apparatus for measurement of electrical conductivity and potential differences of solution, thermostats for determination of solubility, and the usual other facilities for work of this nature are provided.— *Hours arranged with instructor, throughout the year.*

**Bacteriology, Hygiene, Physiological Chemistry.**

The courses here announced presuppose that the student taking them is prepared for original research.

Professor VAUGHAN: —

**Original Research on the Causation of Disease.**

*Hours arranged with instructor, either first or second semester.*

Professor NOVY: —

**Special Methods in Bacteriology.**

A course in advanced laboratory work in bacteriology. It deals with the preparation and use of Pasteur pipettes, the drawing of

blood, the collection and sterilization of serum, the filtration of bacterial liquids, the preparation of tuberculin, tetanus, and diphtheria toxins, the preparation of antitoxic and anti-infectious sera, serum agglutination, the determination of the thermal death-point, of the action of antiseptics and disinfectants, the detection of bacteria in sections, the collodium sac method, inoculation for rabies, etc. The student, when qualified, is assigned special problems for investigation and research.

The course must be preceded by Courses 2 and 3, described in the University Calendar for 1900-1901, page 100.—*Hours arranged with instructor, either first or second semester.*

#### Advanced Physiological Chemistry.

Laboratory work and reading.—*Hours arranged with instructor, either first or second semester.*

#### Methods of Hygiene.

Chemical and bacteriological examination of water, air, soil, milk, butter, etc.—*Hours arranged with instructor, either first or second semester.*

#### Astronomy.

A knowledge of general Astronomy and calculus is required for all courses. In the theoretical courses a careful training is given in those principles of exact astronomy which should be prerequisites for all investigations.

Professor HALL: —

#### Spherical Astronomy.

Transformation of coordinates, precession, nutation, aberration, determination of fundamental constants, and theory of instruments.—*Three hours a week, throughout the year.*

#### Theory of Least Squares.

*Two hours a week, first semester.*

#### Theory and Computation of Orbits.

*Five hours a week, first semester.*

#### Mathematical Theory of Planetary Motion.

*Three hours a week, second semester.*

#### Extended Practical Course.

*Hours arranged with instructor, throughout the year.*



NOTE.—The Observatory is provided with a 12¾-inch equatorial by Fitz, a 6 1-3-inch Pistor and Martins meridian circle, 6-inch Fauth equatorial, 3-inch meridian transit with zenith telescope attachments, surveyor's transit, sextant, chronograph, and chronometers.

### Mineralogy.

The higher work in mineralogy presupposes an elementary knowledge of chemistry, and an introductory course in mineralogy, combining theoretical instruction with practice in determining minerals. The work is directed by Professor PETTEE.

### Geology.

The course of instruction in geology for undergraduates, as announced in the University Calendar for 1900-1901, pp. 104 and 105, embraces from two to three years University work. The first year is devoted to elementary studies in physical geology, historical geology, and physical geography, giving three hours a week to each for one semester. Le Conte's Elements of Geology and Dana's Manual of Geology are used, supplemented by lectures and exhibitions of specimens, maps, etc. During the second year more detailed instruction is given, two hours each week, in the same general subjects. Green's Physical Geology is used for reference during the first semester, supplemented by lectures and laboratory work. Each student is given a special subject for investigation in connection with which a thesis of about 2,500 words is required. During the second semester palæontological studies are carried on with the aid of various treatises and laboratory work. A special subject is assigned each student and a short thesis is required.

Students in the graduate school may enter either of the advanced courses mentioned above, provided studies equivalent to the elementary courses have been pursued. Those who have done more work than is represented by the elementary course may make special arrangements for instruction and assistance in various lines of study dependent on their tastes and acquirements. In a general course the current literature of geology will be read with special reference to Pleistocene geology, and to the origin and classification of topographic forms, glacial records, lake histories, erosion, and all of the processes by which the surface of the earth has come to have its present form.

The geological museum is being arranged and a series of fossils selected to illustrate the life history of North America. This col-

lection is intended especially for the use of students in the elementary courses, but may be consulted by advanced students as well. The specimens will be exhibited in the lecture room as required, and after lectures will be returned to the cases in the museum where they will be available for examination at any time.

There is a second collection embracing some ten thousand specimens of both American and European fossils, which is arranged zoologically and intended for the use of advanced students in palæontology. Special collections of rocks, brachiopods, corals, etc., numbering from one hundred and fifty to two hundred specimens each are arranged in the geological laboratory for the immediate use of students.

The collection in physical geology is small, but efforts are being made for its enlargement, and ample material will be on hand to illustrate lectures in this department. Students bringing private collections will be given an opportunity to arrange them in cases provided for the purpose, and facilities for consulting original monographs and making comparison with specimens in the museum.

The geological laboratory is provided with apparatus for preparing thin sections of fossils and rocks, and with microscopes and photographic instruments. The laboratory is open to students from nine until five each day throughout the collegiate year.

The work in geology is conducted by, or under the direction of, Professor RUSSELL.

### **Botany.**

The work in botany in this University is divisible into morphology, physiology, and ecology. For their study there are specially equipped rooms with a large amount of general and special apparatus. New apparatus is purchased or constructed as it may be needed in investigation. In the laboratory is shelved a working library, including the leading domestic and foreign journals and ample facilities for tracing the literature of any subject.

The herbarium contains 80,000 specimens, being especially rich in algae and economic fungi. A plant garden on the campus, adjacent plant houses, and woods, fields, swamps, and waters in the vicinity furnish material for study and opportunity for experiment.

To be admitted to graduate work, a student must have pursued the collegiate study of botany for at least a year. A minor in botany for the master's degree will not include research; but a major in botany for the master's degree may include research, or may be taken wholly

in courses, according to preparation and needs of the candidate. In any case the candidate receives special supervision and direction from the instructor. For the doctorate, a minor in botany will be approximately equivalent to a major for the master's degree. The requirements for a major are to be found on pages 8-9 of this Announcement.

#### A. FOR GRADUATES AND UNDERGRADUATES.

The equivalent of a full year in the collegiate study of botany is required for admission to any of the courses named below, nearly all of which consist largely of laboratory work.

Professor SPALDING: —

##### Ecology.

A study of the habits and adaptations of plants. The floras of glacial lakes, sphagnum swamps, and the Huron river in the vicinity of Ann Arbor afford part of the material and topics for this course. Lectures with field work and reports, *two or more hours a week, first semester.*

##### Distribution of Plants.

Lectures in connection with studies of the local flora.— *Two or more hours a week, second semester.*

##### Teachers' Course.

Conferences and reports on books, apparatus and material for high school laboratories; practical methods of collecting and preserving material and conducting field observations.— *One hour a week, second semester.*

Professor NEWCOMBE: —

##### General Morphology and Physiology.

Cell structure, tissue structure, and organography; the cell theory, mitosis, heredity; practice in technique. Lectures and laboratory work.— *Five hours a week, first semester.*

##### Experimental Physiology of Plants.

A laboratory and outdoor study of the relation of plants to their environment, as manifested by the phenomena of nutrition, growth, and irritability. This work is divided into two courses; the more elementary course is given the *second semester*, and may be followed in the *first semester* of the next year by the more advanced course which is preparatory to research. Lectures and laboratory work.— *Five or more hours a week, throughout the year.*

Dr. POLLOCK: —

##### Reproduction and Embryology of Flowering Plants.

A study of the development of pollen and the embryo sac ; fertilization ; alternation of generations : embryology. Lectures and laboratory work.— *Three hours a week, second semester.*

THE BOTANICAL FACULTY: —

Current Literature of Botany.

Meetings of instructors and advanced students are held once a fortnight throughout the year at which reports of original work and reviews of important contributions to botanical literature are made.

B. PRIMARILY FOR GRADUATES.

Professor SPALDING: —

Ecological Investigations.

Problems as to the origin of specific characters ; variation ; parasitism and symbiosis ; and the origin of local plant societies.— *Five or more hours, each semester.*

[Investigations in the Morphology and Physiology of Fungi.

Fungous diseases, general morphology, relationship, distribution, ecology. Omitted in 1901–1902.]

Professor NEWCOMBE: —

Investigations in Physiology and Cytology.

Problems in plant nutrition, growth, irritability, reproduction, cell division, and cell physiology.

The Botanical Faculty: —

Field Club.

Excursions under the direction of different members of the staff of instructors are made for the purpose of becoming familiar with the local flora and studying the habits of its plant societies.— *Second Semester.*

Zoology.

The courses here announced presuppose a year's work in general biology, such as is carried on in this University conjointly by the departments of botany and zoology.

Graduate students will often find the elementary work in general biology of value to them, and they can rarely omit, without loss, any of the courses in zoology that are open to undergraduates.

A description of the laboratory is given in the University Calendar for 1900–1901, page 36. A library shelved in the laboratory con-

tains sets of the important English and foreign periodicals, as well as many monographs, and other separate publications. It contains also an extensive collection of books and articles relating to the invertebrate fauna of fresh waters. The library of the Department of Medicine and Surgery, which is rich in the literature of vertebrates, is also accessible to students. The original papers in connection with both lectures and laboratory work are placed in the hands of students, and special reading is required.

A student who selects zoology as a *minor for the master's degree* will usually pursue but one of the lines of work indicated below, and will not undertake research work. If zoology be chosen as a major, the work will ordinarily include research.

For the doctorate a minor in zoology will involve about as much work as a major for the master's degree, but may not include research.

Those electing zoology as a *major for the doctor's degree* are expected to complete all the courses offered. During the first part of his term of residence at the University, the candidate should devote his time to these courses and to the completion of work on the minors. In his second year of residence, in addition to completing the work mentioned, he is expected to repeat a designated piece of research work in order to acquaint himself with methods of investigation. At the same time he does assigned reading on the more important problems of zoology and on zoological history and theory. At the least, one year must be devoted to the research which is to be embodied in the doctor's dissertation.

For suggestions as to the order of courses, consult the undergraduate announcement.

Those electing zoology as a major, will find it of advantage to select, as a *minor study*, some one of the following subjects: Anatomy, histology, botany, physiology, palæontology, physiological psychology. Less closely related is work in bacteriology, physiological chemistry, physical chemistry, organic chemistry, and geology.

#### A. FOR GRADUATES AND UNDERGRADUATES.

Professor REIGHARD:—

##### Vertebrate Zoology and Comparative Anatomy.

The work in this subject consists of three lectures and about twelve hours of laboratory work throughout the year. The forms studied in detail in the laboratory are the lancelet, the lamprey, skate, perch, turtle, bird, and cat. At the same time preparations of related forms are studied. The lectures are illustrated by many charts and preparations, made especially for the course, and by

numerous lantern slides. It should be noted that the course *includes the work in mammalian anatomy* formerly announced as a separate course.—*Six hours a week, throughout the year.*

This course is given in 1901-1902, and in alternate years thereafter.

### Comparative and Experimental Embryology (chiefly of Vertebrates).

The course consists of three lectures and about twelve hours of laboratory work throughout the year. During the first part of the course (until March 15), the laboratory work deals with the chick, and the lectures chiefly with organogeny. During the second part of the course living embryological material is used, and from all vertebrate classes. The work is then comparative and experimental, and deals with the lamprey, the dog-fish (*amia*) numerous bony fishes (*Stizostedion*, *Perca*, *Ameiurus*, *Catastomus*, etc.), numerous amphibia (*Rana*, *Bufo*, *Amblystoma*, etc.), all of which are available in abundance in this locality, in addition to the usual reptilian, avian, and mammalian material. Invertebrate material is also utilized to a considerable extent. It is the purpose of the second part of the course to develop the experimental side of embryology.—*Six hours, throughout the year.*

This course is omitted in 1901-1902, but will be given in alternate years thereafter.

### Animal Behavior.

*Two hours, second semester.*

(See announcement of the same course under Dr. HOLMES, below.)

### Systematic Zoology: The Fishes.

Students will work on the local fauna.—*Two or three hours, throughout the year.*

### Assistant Professor JENNINGS:—

#### Physiological Zoology.

A course in the general physiology of animals, dealing with the *processes* occurring in living matter. The course is intended to lay the basis for an understanding of modern experimental work in biology and the theories based upon it, as well as to serve as an introduction to the courses in the special physiology of man. Lectures and laboratory work.—*Four hours, second semester.*

**Teachers' Course: High School Zoology and Methods of Teaching It.**

A study of the animals considered suitable for a high school course. Subjects are assigned to individual students, and they prepare outlines for high school use. The work is accompanied by reading and conferences.— *One hour, second semester.*

**Systematic Zoology: The Rotifers.**

Students will work on the local fauna.— *Two or three hours, throughout the year.*

**Dr. HOLMES: —**

**Invertebrate Zoology.**

The structure, classification, habits, and distribution of invertebrate animals with special reference to the influence of environment, to adaptation, and to the general principles of organic evolution.— *Five times a week, first semester.*

**Animal Behavior.**

A study of the behavior of animals in their natural environment, and of their means of adaptation to their environment; including a comparative study of instinct in different groups of animals, social life of animals, the conduct of animals as modified by experience.

Field and laboratory work upon topics is assigned to individual students. An attempt is made to carry the experimental method into the field, and to use it in the laboratory for the interpretation of activities observed in the field or under natural conditions.— *Two hours a week, throughout the year.*

**Systematic Zoology: The Crustacea.**

Students will work on the local fauna.— *Two or three hours a week, throughout the year.*

**B. PRIMARILY FOR GRADUATES.**

**Professor REIGHARD: —**

**Investigations in**

- a) The embryology of the lower vertebrates.
- b) The behavior of fishes and other lower vertebrates.

**Assistant Professor JENNINGS: —**

Investigations in experimental zoology; the reactions of animals to stimuli,

**Dr. HOLMES: —**

Investigations in

- a) Cytology.
- b) The behavior of animals.

**The ZOOLOGICAL FACULTY: —**

The instructors and advanced students hold weekly meetings, at which reports are made on the research work of members of the zoological staff, and on important current papers, followed by informal discussion. Although the meetings are open to all, the membership is restricted.— *One hour a week, throughout the year.*

**FIELD CLUB.**

This is a voluntary organization of zoological students for the purpose of studying the local fauna. Field excursions are made at regular intervals, and occasional meetings are held for lectures and for other purposes. Members of the zoological staff are members of the club, and take part in its work. The zoological staff has further undertaken a systematic study of the local fauna. Instruction is offered in the subject (see under Systematic Zoology) and it is hoped thus to stimulate field work.— *Throughout the year.*

**Physiology.**

The advanced work in physiology presupposes a knowledge of anatomy, including histology and the elements of physics and chemistry. Ability to read German is indispensable, and French is desirable for students taking physiology as a major study for an advanced degree, though in some cases a candidate may be considered qualified to begin his advanced work prior to the completion of these requirements.

**Professor LOMBARD: —**

Lectures and recitations.

*Five hours a week, first semester; three hours a week, second semester.*

Laboratory Course.

*Four afternoons a week, one-third of a semester.*

Advanced Course in Physiological Experimentation.

*One afternoon a week, one semester.*

Physiological Research and Collateral Reading.

Arranged to meet the needs of students who take physiology as a major study.



### **Anatomy.**

Before entering upon graduate work in the department of Anatomy, a student must have completed courses in the following subjects (for a more detailed statement of which the University Calendar may be consulted) or an equivalent amount of work along similar lines: Anatomy Courses 1 (Osteology), 2, and 3 (General Anatomy), 5 and 6 (Practical Anatomy), 7 or 8 (Vertebrate Histology and Histogenesis), Zoology, Course 9 (Vertebrate Embryology) or the course in Embryology given by Dr. Huber in the Medical Department.

**Professor McMURRICH:—**

**The Anatomy of the Central Nervous System.**

*Two hours a week, first semester.*

**Professor McMURRICH and Professor HUBER.**

**Advanced Work in the Anatomy of the Central Nervous System.**

This course is a continuation of the preceding, and consists principally of laboratory work and special reading.—*Hours to be arranged with instructors.*

**Structure of the Sense Organs.**

This course is principally a laboratory course. The various special sense organs will be studied with the aid of the modern histological methods, and a certain amount of special reading will be required.—*Hours to be arranged with instructors.*

**Anatomical and Embryological Research.**

Students electing this course will be assigned special topics for investigation under the supervision of the instructors.—*Hours to be arranged with instructors.*

**Professor HUBER:—**

**Research work in Histology and Histogenesis.**

*Hours to be arranged with instructor.*

# Catalogue of Students. 1900-1901.\*

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## RESIDENT GRADUATES.

| NAME.                                                                                                                                                     | RESIDENCE.          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| Joseph Ellet Antram, A.B., <i>Mount Union College</i> , 1897, <i>s</i> ,<br>Latin; History; Hellenistic Greek.                                            | <i>Alliance, O.</i> |
| Lois LeBaron Avery, B.L., 1898,<br>Rhetoric; American History; English Literature.                                                                        | <i>Ann Arbor.</i>   |
| Benjamin Franklin Bailey, B.S., 1898, A.M.,<br>1900,<br>Physics; General Chemistry; Mathematics.                                                          | <i>Detroit.</i>     |
| Joseph Hershey Bair, Ph. B., 1900,<br>Psychology; Political Economy; Sociology.                                                                           | <i>Hall, Pa.</i>    |
| Lina Belle Baum, A.B., <i>Albion College</i> , 1899,<br>English Literature; German; Pedagogy.                                                             | <i>Albion.</i>      |
| Grace Griffith Begle, Ph.B., 1900.<br>Latin; Roman Political Antiquities; Rhetoric.                                                                       | <i>Ann Arbor.</i>   |
| Winifred Ernestine Beman, A.B., 1899, <i>Holder of the Peter White Fellowship in American History</i> ,<br>American History; European History; Sociology. | <i>Ann Arbor.</i>   |
| Mary Ella Bennett, Ph.B., 1895,<br>Botany; Plant Physiology; General Chemistry.                                                                           | <i>Ann Arbor.</i>   |
| Winifred Bogle, A.B., 1900,<br>Greek; Latin; German.                                                                                                      | <i>Ann Arbor.</i>   |

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\*The principal subjects of study pursued by candidates for an advanced degree are indicated under their respective names; the subject first named being the major study.

An asterisk (\*) before a student's name indicates that the student is also pursuing studies in the Department of Law.

A dagger (†) indicates that the student was admitted to the Graduate School at the beginning of the second semester, on completion of the requirements for the bachelor's degree, though the degree was not to be conferred until the end of the year.

The letter *s* denotes that the student was also enrolled in the Summer school of 1900.

- Jennie Bogner, B.L., 1899, *Saint Joseph.*  
American History; European History; Political Economy.
- Wilbur Pardon Bowen, B.S., 1900, *Ann Arbor.*  
Physiology; Physiological Chemistry; Vertebrate Histology.
- Harold Martin Bowman, LL.B., 1899, B.L., 1900, *Des Moines, Ia.*  
Finance; Comparative Constitutional Law; History.
- Marcus Calvin Boylan, B.S., 1894, *Ann Arbor.*  
Analytical Chemistry; Chemical Technology; Physics
- Milo Stacy Brown, B.S., *Alfred University,*  
1900, *Alfred, N. Y.*  
Mathematics; Astronomy; Geology.
- Frank Egbert Bryant, B.L., 1899, *Grand Rapids.*  
Rhetoric; English Philology; Æsthetics.
- Charles William Burrows, A.B., 1898, *Detroit.*  
Physics; Mathematical Physics; Mathematics.
- Vernon Eli Bush, Ph.B., 1900, *Battle Creek.*  
Economics; History; Commercial Law.
- Orma Fitch Butler, A.B., 1897, *s,* *Ann Arbor.*  
Latin; Roman Political Antiquities; English Literature.
- Kenyon Leech Butterfield, B.S., *Michigan Agri-*  
*cultural College,* 1891, *s,* *Ann Arbor.*  
Political Economy; Sociology; History of Education.
- Agnes Ophelia Cady, B.L., 1900, *Ann Arbor.*
- †James Andrew Campbell, A.B., 1901, *Ypsilanti.*  
German Literature; Germanic Philology; English Literature.
- Margaret Sprague Carhart, Ph.B., 1899, *Ann Arbor.*  
History; Rhetoric; German.
- Elisha Warner Case, B.S., 1900, *Chicago, Ill.*  
Organic Chemistry; Chemical Technology; General Chemistry.
- Clarence Luther Catherman, Ph.B., *Hillsdale*  
*College,* 1897, *Mottville.*  
Pedagogy; Sociology; English Literature.
- Vera Chamberlin, Ph.B., 1900, *Montpelier, O.*  
English Literature; German; Rhetoric.
- Alphonso Morton Clover, B.S., 1899, *Ann Arbor.*  
General Chemistry; Organic Chemistry; Physical Chemistry.
- Ernest Alva Coddington, B.S., *Olivet College,*  
1898, *Morenci.*  
Pedagogy; Psychology; English Literature.
- Carl Herbert Cooper, A.B., *Upper Iowa Uni-*  
*versity,* 1895, A.M., 1897, *Saginaw, W. S.*  
Political Economy; Finance; History.

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| Winifred Campbell Daboll, A.B., 1900,<br>Latin; Roman Antiquities; English Literature.                                                                                                | <i>Saint Johns.</i>     |
| Caroline Elizabeth DeGreene, Ph.B., <i>Earlham College</i> , 1893, s,<br>German Literature; Germanic Philology; French Literature.                                                    | <i>Ann Arbor.</i>       |
| Minna Caroline Denton, B.S., 1900,<br>Botany; Plant Physiology; Ecology.                                                                                                              | <i>Fort Smith, Ark.</i> |
| John Dieterle, A.B., 1898,<br>Germanic Philology; Germanic Literatures; Philosophy of Religion.                                                                                       | <i>Ann Arbor.</i>       |
| Harry Clifford Doane, B.S., 1900,                                                                                                                                                     | <i>Ann Arbor.</i>       |
| Joseph William Tell Duvel, B.S., <i>Ohio State University</i> , 1897, <i>Holder of the Dexter M. Ferry Botanical Fellowship</i> ,<br>Botany; Vegetable Physiology; Organic Chemistry. | <i>Wapakoneta, O.</i>   |
| Oren Samuel Flanagan, A.B., <i>Kalamazoo College</i> , 1892,<br>European History; American History; Pedagogy.                                                                         | <i>Ann Arbor.</i>       |
| Victoria Margaret Fohey, Ph.B., 1900,<br>English Literature; Rhetoric; French.                                                                                                        | <i>Ann Arbor.</i>       |
| Clarence James Foreman, B.S., <i>Michigan Agricultural College</i> , 1894, M.S., <i>ibid</i> , 1896,<br>History; Political Economy; Pedagogy.                                         | <i>Harbor Springs.</i>  |
| Frederick Russell Gorton, B.S., 1900,<br>Physics; General Chemistry; Mechanica.                                                                                                       | <i>Ypsilanti.</i>       |
| Frances Katherine Gould, B.L., 1892,<br>English Literature; American Literature; Rhetoric.                                                                                            | <i>Flint.</i>           |
| Ida Augusta Green, Ph.B., <i>Oberlin College</i> , 1890,<br>American History; English Literature; Sociology.                                                                          | <i>Brookland, D. C.</i> |
| Jessie Scott Gregg, B.L., 1898,<br>Rhetoric; English Literature; Ethica.                                                                                                              | <i>Ann Arbor.</i>       |
| Martha Nathalie Greiner, Ph.B., 1900,<br>German Literature; French Literature; Latin.                                                                                                 | <i>Lisbon.</i>          |
| Walter David Hadzsits, A.B., 1898, A.M., 1899,<br><i>Holder of the James W. Scott Classical Fellowship</i> (studying in Rome),<br>Latin; Greek; Philosophy.                           | <i>Detroit.</i>         |
| Walter Monroe Hamilton, A.B., 1894, A.M., 1896,                                                                                                                                       | <i>Ann Arbor.</i>       |
| Carrie Adelaide Hardy, B.S., 1896,<br>General Chemistry; Physical Chemistry; Mineralogy.                                                                                              | <i>Ypsilanti.</i>       |
| Enoch Horton Harriman, B.L., 1892,<br>Physics; Mathematics; General Chemistry.                                                                                                        | <i>Fenwick.</i>         |

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|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| Bernice Lena Haug, B.S., 1894,<br>Botany; Plant Physiology; General Chemistry.                                                                     | <i>Ann Arbor.</i>                          |
| Henry Heitmann, Ph.B., 1899,<br>History of Philosophy; Hegel's System; German.                                                                     | <i>New Bremen, O.</i>                      |
| Constans Alexis Hemborg, A.B., <i>Augustana College</i> , 1899, Ph.B., 1900,<br>Latin; Roman Archæology; English Literature.                       | <i>Moline, Ill.</i>                        |
| Berton James Howard, B.S., 1897,<br>Botany; Physics; General Chemistry.                                                                            | <i>Ionia.</i>                              |
| Alice Sarah Hussey, A.B., <i>Vassar College</i> , 1894,<br>A.M., 1899,<br>Rhetoric; Æsthetics; English Literature.                                 | <i>Rochester, N. Y.</i>                    |
| Charles Willis Johnson, Ph.C., 1896, B.S.<br>(Phar.), 1900,<br>Organic Chemistry; General Chemistry; Pharmacognosy.                                | <i>Ann Arbor.</i>                          |
| Lewis Ralph Jones, Ph.B., 1889,<br>Plant Physiology; Systematic Botany; Bacteriology.                                                              | <i>Burlington, Vt.</i>                     |
| Mildred Hannah Keith, A.B., 1900, s,<br>Greek; Latin; History.                                                                                     | <i>Pontiac.</i>                            |
| Walter James Kent, B.S., 1894,<br>Zoology; Botany; Plant Physiology.                                                                               | <i>Ann Arbor.</i>                          |
| Rae Harman Kiteley, A.B., 1899, s,<br>History; Administrative Law; Pedagogy.                                                                       | <i>Ann Arbor.</i>                          |
| Elana Goddard Knott, A.B., <i>University of Cincinnati</i> , 1900,<br>English Literature; Rhetoric; Latin.                                         | <i>Cincinnati, O.</i>                      |
| Daisy Alice Kugel, B.L., 1900,<br>English Literature; American Literature; French.                                                                 | <i>Sandusky, O.</i>                        |
| Carl Frederick Augustus Lange, A.B., 1894,<br>A.M., <i>Harvard University</i> , 1899,<br>Germanic Philology; German Literature; English Philology. | <i>Saginaw.</i>                            |
| Harmon Lee Lawyer, A.B., <i>Olivet College</i> ,<br>1895,<br>History; Pedagogy; English Literature.                                                | <i>Burton, O.</i>                          |
| Willy Lehnartz, B.S., 1900,<br>Mathematics; Physics; Applied Mechanics.                                                                            | <i>Grand Rapids.</i>                       |
| John Seymour McElligott, Ph.B., 1900,<br>Political Economy; Sociology; Industrial History.                                                         | <i>Ann Arbor.</i>                          |
| Norman King McInnis, A.B., 1898, A.M., 1899,<br>English Literature; Rhetoric; Philosophy.                                                          | <i>Saginaw.</i>                            |
| Agnes MacNaughton, B.L., 1899,<br>Sebern Sylvester McVay, Ph.B., 1899,<br>Mathematics; Physics; Astronomy.                                         | <i>Ann Arbor.</i><br><i>Oskaloosa, Ia.</i> |

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- Kristine Mann, A.B., *Smith College*, 1895, *Orange, N. J.*  
 Rhetoric; English Literature; Philosophy.
- Charles Edward Marshall, Ph.B., 1895, *s*, *Agricultural College.*  
 Bacteriology; Hygiene; Organic Chemistry.
- John Jay Marshall, Ph.B., *Albion College*, 1893, *Ann Arbor.*  
 General Chemistry; Physical Chemistry; Physics.
- Yoshinaga Mikami, *Keio College*, 1897, *Kofu, Japan.*  
 Political Economy; History; International Law.
- Aura Maud Miller, B.L., 1890, A.M., 1897, *Ann Arbor.*  
 English Literature; English Philology; Pedagogy.
- Katharine Cook Miller, B.L., 1900, *Ann Arbor.*
- Lyman Foote Morehouse, B.S., 1897, *Ann Arbor.*  
 Physics; Mathematics; General Chemistry.
- Seymour Tenny Morse, C.E., 1878, *Ann Arbor.*
- Raymond Pearl, A.B., *Dartmouth College*, 1899, *Ann Arbor.*  
 Experimental Zoology; Plant Physiology; Psychology.
- Claude Francis Peck, A.B., *Albion College*, 1900, *Shelby.*  
 Analytical Chemistry; Chemical Technology; Organic Chemistry.
- Harlow Stafford Person, Ph.B., 1899, A.M., *Ann Arbor.*  
 1900,  
 Economic Geography; Economic Theory; Finance.
- †Maud Philips, A.B., 1901, *Ann Arbor.*  
 American History; English Literature; Rhetoric.
- Lettie Jeannette Poe, B.L., 1900, *Ashland, O.*  
 Mathematics; Physics; Pedagogy.
- Harrison McAllester Randall, Ph.B., 1893, *Ann Arbor.*  
 Ph.M., 1894,  
 Physics; Mathematics; General Chemistry.
- †Anna Louise Rhodes, A.B., 1901, *Ada.*  
 Botany, Zoology; Sociology.
- Gilbert Jeremiah Roberts, A.B., *Penn College*, *Oskaloosa, Ia.*  
 1892, A.M., *ibid*, 1899, *s*,  
 Latin; Greek; Roman Archæology.
- Jessie May Robertson, Ph.B., 1900, *Petoskey,*  
 Latin; German; Pedagogy.
- Harry Milton Robins, A.B., 1900, *Whitmore Lake.*  
 American History; Administrative Law; Political Economy.
- Alice Eleonore Rothman, Ph.B., 1896, *s*, *Ann Arbor.*  
 Germanic Philology; German Literature; English Literature.
- Walter Edward Sanders, A.B., *Yale University*, *Detroit.*  
 1894,

- Thomas Martin Sattler, B.S., *Olivet College*,  
1900, s, *Charlotte*.  
American History; European History; Pedagogy.
- Daniel Cornelius Schaffner, A.B., *College of*  
*Emporia*, 1898, *Morganville, Kan.*  
Geology; Mineralogy; Zoology.
- Vera Zoe Schurtz, A.B., 1900, *Ann Arbor*.  
Mathematics; English Literature; American History.
- \*Thomas Hall Shastid, M.D., *University of Ver-*  
*mont*, 1888, A.B., *Harvard Univ.*, 1893, *Battle Creek*.  
English Literature; English Philology, Rhetoric.
- Flora Ann Sigel, Ph.B., 1898, *Hamburg, N. Y.*  
American History; European History; English Literature.
- Martin Simpson, B.S., *Olivet College*, 1899,  
A.M., 1900, *Deckerville*.
- John Willis Slaughter, A.B., *Lombard Univer-*  
*sity*, 1898, B.D., *ibid*, 1898, *Camp Hill, Ala.*  
Metaphysics; Psychology; Sociology.
- Harrison Standish Smalley, A.B., 1900, *Chicago, Ill.*  
Political Economy; Constitutional History; Jurisprudence.
- George Washington Spindler, A.B., *Indiana*  
*University*, 1900, *Woodland*.  
German Literature; Germanic Philology; Latin.
- George Robert Swain, A.B., 1897, *Lakeport, N. H.*  
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- Frank Stone Swift, B.S., *Olivet College*, 1897, *Olivet*.  
General Chemistry; Analytical Chemistry; Physics.
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Latin; Greek; Pedagogy.
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Botany; Zoology; General Chemistry.
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*of Kansas*, 1899, *Lawrence, Kan.*  
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Zoology; Plant Morphology; Plant Physiology.
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| Sara Whedon, A.B., 1889,<br>English Literature; Old English; Gothic.                                                    | <i>Ann Arbor.</i>      |
| Jennie Patterson White, Ph.B., 1897,<br>Rhetoric; Æsthetics; German.                                                    | <i>Peoria, Ill.</i>    |
| Herbert William Whitten, A.B., 1898,<br>Greek; Latin; Latin Philology.                                                  | <i>Bridgman.</i>       |
| Ernest Paul Wiles, A.B., <i>Indiana University</i> ,<br>1898,<br>English Literature; Rhetoric; American History.        | <i>Anderson, Ind.</i>  |
| Vernon Justin Willey, B.S., <i>Michigan Agricultural College</i> , 1893, s,<br>General Chemistry; Physics; Mathematics. | <i>Ann Arbor.</i>      |
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| Lewis Merton Parrott, B.S., 1896,<br>Mathematics; Physics; Pedagogy.                           | <i>Saginaw.</i>         |



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